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by

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*

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REVISED TABLE OF EARTH SATELLITES. VOLUME 1. 1957 TO 1968

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SUMMARY

An earlier version of this Table was issued in 1970. The present revised edition incorporates several thousand amendments that have accumulated in the past eight years, and supersedes the previous version. Satellites launched in the years 1969-1973 are listed in Volume 2 (issued in 1974) and the launches during 1974-1978 will appear in Volume 3.

The present volume includes 768 satellite launches, arranged chronologically. For each launch, the Table gives the name and international designation of each instrumented satellite and final-stage rocket, with the date of launch, lifetime (actual or estimated), mass, shape, dimensions and at least one set of orbital parameters. Other fragments associated with a launch are listed without these details.

The main Table, which occupies 184 pages, is prefaced by nine pages of introduction and explanation, and followed by a nine-page index.

Departmental Reference: Space 544

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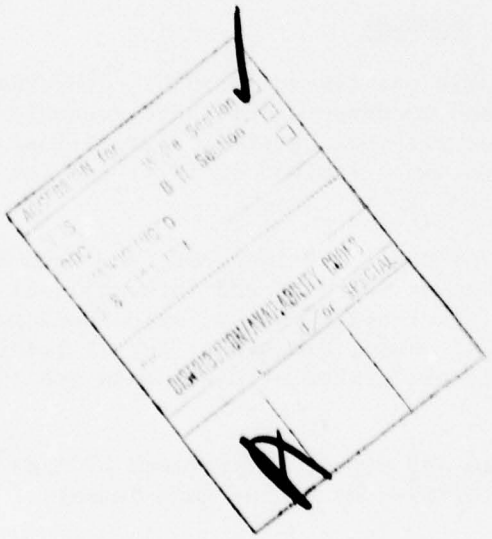


1 INTRODUCTION

A Table of artificial satellites, giving launch dates, lifetimes, weights, sizes and orbits, has been issued by the Royal Aircraft Establishment since 1958, with yearly revisions and monthly supplements. The launches are listed chronologically, with Volume 1 covering the years 1957-1968, Volume 2 the years 1969-1973, and Volume 3 the years 1974-1978. Volume 1 was previously issued[1] in 1970; several thousand amendments have now accumulated and are incorporated in this new issue. The changes are too multifarious to describe, but the most important are perhaps the insertion of decay dates for the eight years 1970-1977, revisions of the estimated mass and dimensions of many Cosmos rockets, and the insertion of new orbits and revised lifetime estimates.

The present volume is updated to the end of 1977. Volume 2 was issued[2] in 1974, and our intention is to produce a revised version of Volume 2 updated to the end of 1977, followed by the complete Volume 3.

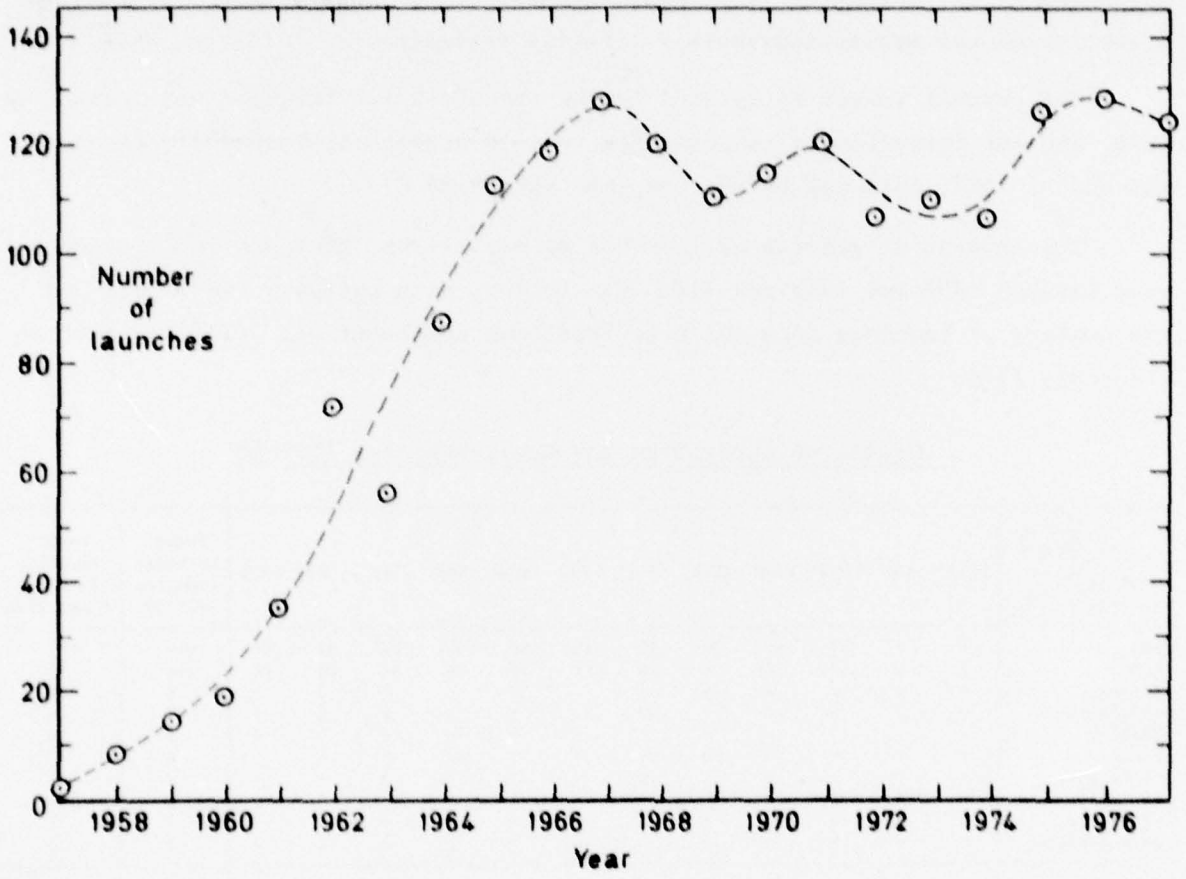
The numbers of successful launches of satellites and space vehicles each year between 1957 and 1968 are tabulated below, with national sub-totals and the numbers of launches from which at least one component was still in orbit on 1 January 1978.

Census of satellites and space vehicles 1957-68

Country of origin \ Year of launch	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	Total National launches 1957-68	Total launches in orbit 1 Jan 1978
USA	-	7	11	16	29	50	38	55	60	72	53	41	432	177
USSR	2	1	3	3	6	20	17	30	48	44	66	74	314	54
France	-	-	-	-	-	-	-	-	1	1	2	-	4	4
US/Intelsat	-	-	-	-	-	-	-	-	1	1	3	1	6	6
US/ESRO	-	-	-	-	-	-	-	-	-	-	-	3	3	0
US/UK	-	-	-	-	-	1	-	1	-	-	1	-	3	0
US/Canada	-	-	-	-	-	1	-	-	1	-	-	-	2	2
US/Italy	-	-	-	-	-	-	-	1	-	-	1	-	2	0
US/France	-	-	-	-	-	-	-	-	1	-	-	-	1	1
US/Australia	-	-	-	-	-	-	-	-	-	-	1	-	1	0
Total launches per year	2	8	14	19	35	72	55	87	112	118	127	119	768	
Total launches still in orbit on 1 Jan 1978	0	1	5	8	8	19	18	26	45	38	42	34		244

Fig 1 below shows the number of launches each year between 1957 and 1977, with a smooth curve drawn through them. The first maximum was reached in 1967, with 127 launches. In the nine years 1969-1977, the number of launches showed quite small oscillations about a fairly steady value, with a minimum of 106 launches in 1972 and 1974, and a maximum of 128 launches, in 1976.

Fig 1 Yearly numbers of satellite launches



2 GUIDE TO TABLE OF SATELLITES

The data given in the main Table, for all satellites other than fragments, are as follows.

Column 1 gives the name of the satellite and its international designation. If the name is unknown, the launching vehicle is indicated in square brackets. Doubtful entries are distinguished by question marks. Letters to the left of Column 1 have the following meanings:

- B denotes unmanned satellites which carried live biological specimens.
- D denotes satellites no longer in orbit on 1 January 1978. (For fragments, D indicates that all have decayed; 1d indicates that one has decayed; 2d indicates that two have decayed, and so on.)
- L denotes satellites with retroreflectors for laser tracking.
- M denotes manned satellites; 2M indicates a crew of two at launch; etc.
- p indicates that pieces were picked up on Earth after re-entry.
- R denotes satellites which returned to Earth and were recovered intact.
- r denotes satellites carrying capsules which were successfully recovered.
- T denotes satellites still transmitting radio signals on 1 January 1978.

Column 2 gives the launch date, lifetime (actual or estimated), and descent date (if appropriate). The dates are given in days and decimals of a day UT. Thus 1966 May 18.70 means "16h 48m UT (or GMT) on 18 May 1966".

Column 3 gives the shape of the satellite and its mass in kilograms (1 kg = 2.205 lb). Sometimes the shape defies description in a few words and the description given is only approximate.

Column 4 gives the basic dimensions of the satellite in metres. Aerials, paddles carrying solar cells, and other components projecting from the main body are not normally taken into account when giving the size and shape (1 m = 3.281 ft).

Column 5 gives the date for the orbital information in Columns 6-12.

Column 6 gives the inclination of the orbit to the equator, in degrees.

Column 7 gives the nodal period of revolution - the time interval, in minutes, between successive northward equatorial crossings by the satellite.

Columns 8-11 specify the size and shape of the orbit. The quantities tabulated are the semi major axis a ; the eccentricity e ; and the perigee and apogee heights $\{a(1 - e) - R\}$ and $\{a(1 + e) - R\}$ respectively, where R is the Earth's equatorial radius, 6378.1 km.
(1 km = 0.6214 statute miles = 3281 ft = 0.5396 nautical miles.)

Column 12 gives the argument of perigee - the angle, measured round the orbit, from the northward equatorial crossing to the perigee.

The names of space vehicles (which have escaped from the dominance of the Earth's gravitational field) are given below the table, on the appropriate pages. Fuller details of the space vehicles are available in Refs 3 and 4.

The index after the main Table gives the names of the satellites in alphabetical order, with the international designation of each and the page on which details may be found. Satellites which are not Russian or American may be found in the index by referring to the appropriate country.

3 METHODS USED

3.1 Difficulties

The chief difficulty is lack of accurate information about the size, shape and weight of most of the satellites. The majority of launchings are military, and little information is released about these satellites or their final-stage rockets; we have to rely largely on deductions from their visual appearance in the night sky and on identifying previous launches of similar character. In contrast, we have full details of international satellites and those launched by NASA.

3.2 Names and designations of satellites

The names given by the launching authorities are indicated when known. For unnamed United States Air Force satellites, the launch vehicle is given in square brackets: the lists issued by the United Nations have been useful in identifying the launch vehicles and orbits for these satellites. Some of the names are given as initials only, and the meanings of these acronyms are given as footnotes.

The international designation of each satellite launching is allocated by the World Warning Agency on behalf of COSPAR. But the identification of particular pieces in a multiple launch has often depended on visual observations, since an experienced visual observer can often recognize the species of rocket

or satellite he is looking at and distinguish between the satellite and its rocket. Small pieces which are, as far as is known, not instrumented satellites, are called fragments.

3.3 Lifetimes

The orbits of most satellites contract slowly under the action of air drag, and the severity of the drag determines their lifetimes, which can be estimated[5] from the orbital decay rates (unless the satellites are swept up as space-rubbish, or suffer other major perturbations). The decay rate depends on air density, and the density depends critically on solar activity, which cannot be accurately predicted. So most lifetime estimates are likely to be in error by 10% or more; if solar activity in future cycles should decline to the low levels prevalent in the late 17th century, lifetimes of 20-50 years given here would be seriously underestimated.

For some of the satellites in high-eccentricity orbits, such as the Molniya satellites and rockets, the lifetimes depend primarily on lunisolar perturbations rather than air drag, and have been estimated by numerical integration of these perturbations, as described in Ref 5.

3.4 Weights and dimensions

The weights and dimensions of the satellites come from Spacewarn launch telegrams, NASA Press Releases, and press and radio reports. Some indication of the accuracy is given by the number of significant figures. Often it is difficult to define the 'length' or 'diameter' when components of irregular size and shape are joined together, and dimensions are therefore sometimes approximate.

For satellites of unknown mass and size, the average cross-sectional area S can be approximately determined from the average brightness when observed visually; the mass/area ratio m/S can be obtained from the rate of change of orbital period and the known air density at heights near perigee, to give a value for the mass m. Many of our values for the dimensions of Russian rockets are based on the detailed studies by Sheldon[6].

We hope that most of the weights and dimensions given with question marks are accurate to within a factor of 1.5, *ie* that the real values are between 2/3 and 3/2 times the value given. It seemed better to give some indication of the weights and sizes, even if approximate, rather than to leave blanks.

3.5 Orbital accuracy

Orbital information has come from many sources. Most of the orbits are based on the elements issued by the United States Air Force, and the remainder come mainly from NASA and RAE orbits.

The accuracy of the orbits varies greatly between one satellite and another, and no detailed guide can be given. Most orbits, however, are believed to have an error (sd) of about 0.02^{o} in orbital inclination, 0.02 min in period, 2 km in semi major axis, 5 km in perigee and apogee heights (when the apogee height is less than 2000 km), 0.001 in eccentricity e , and perhaps 3^{o} in argument of perigee (if $e > 0.02$). Some orbits are much more accurate than this, and some, particularly those with eccentricity exceeding 0.3 or with very short lifetimes, may be much less accurate.

4 RADIO TRANSMISSIONS

At the end of 1977 only four of the satellites in this volume were known to be transmitting (on command) at the following frequencies:-

Explorer 27 (Beacon C)(1965-32A)	136.74 MHz
ATS 1 (1966-110A)	136.47 and 137.35 MHz
ATS 3 (1967-111A)	136.47 and 137.35 MHz
Explorer 36 (Geos 2)(1968-02A)	136.32 MHz

It is estimated that the average active life for radio transmission is about two years for Soviet satellites and seven years for US satellites, so it is possible that a few other satellites are still transmitting. The most complete list of radio frequencies of satellites is in *Telecommunication Journal*, Vol 44, No 2 (1977).

Acknowledgments

We are indebted to the various sources mentioned in the text for information about the satellites, and most of all to the North American Air Defense Command for having issued comprehensive orbital information for so many years. We thank G.E. Perry for providing the descent times of recoverable Cosmos satellites. We are also particularly grateful to Doreen Walker, who began the Table in 1958 in a format that has stood the test of time, and has made many contributions since.

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5	D.G. King-Hele	Methods for predicting satellite orbital lifetimes. RAE Technical Report 77111 (1977)
6	C.S. Sheldon II	*Soviet Space Programs, 1971-75.* *US Government Printing Office, Washington* (1976)

REVISED TABLE OF EARTH SATELLITES

(Year of launch 1957)

	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D	Sputnik 1	1957α2	1957 Oct 4.81 92 days? 1958 Jan 4?	Sphere 83.6	0.58 dia	1957 Oct 4.8 1957 Oct 25.8 1957 Dec 25.1	65.1 65.1 65.0	96.2 95.4 91.0	6955 6916 6702	215 213 190	939 863 458	0.052 0.047 0.020	58 49 23
D	Sputnik 1 rocket	1957α1	1957 Oct 4.81 57.6 days 1957 Dec 1.4	Cylinder 4000?	28 long 2.58 to 2.95 dia	1957 Oct 4.8 1957 Nov 4.0 1957 Nov 24.3	65.1 65.1 65.0	96.2 94.0 91.0	6955 6849 6702	215 203 190	939 738 458	0.052 0.039 0.020	58 45 36
D	Fragment	1957α3											
D B	Sputnik 2	1957β1	1957 Nov 3.1 162.0 days 1958 Apr 14.08	Cone-cylinder 4500? Payload 508.3	31.8 long 2.58 to 2.95 dia	1957 Nov 3.1 1958 Jan 4.0 1958 Feb 21.0 1958 Mar 25.0 1958 Apr 9.0	65.33 65.29 65.26 65.23 65.21	103.750 100.505 97.105 93.785 90.780	7314 7161 6999 6838 6691	212 210 200 187 166	1660 1356 1040 733 460	0.099 0.080 0.060 0.040 0.022	59 35 14 359 352
D	Fragment	1957β2											

	Name	Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D	Explorer 1 1958 α	1958 Feb 1.16 444.29 days 1970 Mar 31.45	Cylinder 13.97 Payload 4.8	2.03 long 0.15 dia	1958 Feb 1.2 1960 Dec 5.3 1967 Nov 28.7	33.24 33.21 33.18	114.8 107.2 100.90	7330 7481 7185	356 347 334	2548 1859 1281	0.140 0.101 0.066	121 10 201
	Vanguard 1 1958 β2	1958 Mar 17.51 300 years	Sphere 1.47	0.16 dia	1958 Mar 17.5 1962 Nov 14.5	34.25 34.25	134.18 133.80	8687 8671	650 648	3968 3938	0.191 0.190	129 85
	Vanguard 1 rocket 1958 β1 Fragment 1958 β3	1958 Mar 17.51 400 years	Cylinder 23	1.2 long 0.51 dia	1958 Mar 17.5 1967 Sep 24.6	34.25 34.26	138.50 138.28	8872 8862	649 658	4340 4309	0.208 0.206	129 164
D	Explorer 3 1958 γ	1958 Mar 26.73 93 days 1958 Jun 28	Cylinder 14 Payload 5	2.03 long 0.15 dia	1958 Mar 26.8 1958 May 15.0 1958 Jun 14.1	33.38 33.35 33.33	115.7 104.8 96.8	7871 7369 6990	186 180 171	2799 1802 1052	0.166 0.110 0.063	90 70 326
D	Sputnik 3 1958 δ2	1958 May 15.3 692.0 days 1960 Apr 6.3	Cone 1327	3.76 long 1.73 dia	1958 May 15.3 1959 Jan 1.3 1960 Jan 3.8 1960 Mar 24.5	65.18 65.15 65.11 65.06	105.97 102.000 94.000 90.000	7418 7232 6849 6653	217 210 190 162	1864 1497 751 388	0.111 0.089 0.041 0.017	58 331 182 146
D	Sputnik 3 rocket 1958 δ1	1958 May 15.3 202.4 days 1958 Dec 3.7	Cylinder 4000?	28 long 2.58 dia 2.95 dia	1958 May 15.3 1958 Aug 15.1 1958 Oct 11.2 1958 Nov 30.6	65.18 65.14 65.10 65.00	105.90 102.000 98.000 90.000	7415 7232 7042 6653	214 210 199 162	1860 1497 1128 388	0.111 0.089 0.066 0.017	58 26 5 339
D	Fragments 1958 δ3-5											
D	Explorer 4 1958 ε	1958 Jul 26.63 454 days 1959 Oct 23	Cylinder 17.5 Payload 8	2.03 long 0.15 dia	1958 Jul 26.7 1959 Mar 21.0 1959 Aug 22.0 1959 Oct 19.5	50.3 50.25 50.25 50.25	110.18 102.37 96.05 90.0	7616 7252 6950 6656	263 257 239 204	2213 1490 906 351	0.128 0.085 0.048 0.011	50 60 252 120
D	Atlas (Score) 1958 ζ	1958 Dec 18.96 33.6 days 1959 Jan 21.6	Cylinder 3900 Payload 70	25 long 3.0 dia	1958 Dec 19.0 1959 Jan 1.8 1959 Jan 17.0	32.3 32.3 32.3	101.47 98.12 92.7	7213 7053 6752	185 181 169	1484 1169 658	0.090 0.070 0.036	130 249 37

Space vehicles: Pioneer 1, 1958 η; Pioneer 3, 1958 θ

	Name	Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
	Vanguard 2 1959 α1	1959 Feb 17.67 150 years	Sphere 9.8	0.51 dia	1959 Feb 17.7 1967 Nov 21.5	32.88 32.87	125.7 125.20	8318 8294	559 555	3320 3276	0.166 0.164	135 135
	Vanguard 2 rocket 1959 α2 Fragment 1959 α3	1959 Feb 17.67 150 years	Cylinder 23	1.2 long 0.51 dia	1959 Feb 17.7 1967 Nov 26.4	32.92 32.91	130.0 129.42	8506 8481	563 559	3693 3646	0.184 0.182	135 -
D	Discoverer 1 1959 β	1959 Feb 28.91 5 days? 1959 Mar 5?	Cone-cylinder 618	6 long 1.5 dia	1959 Feb 28	89.7?	96?	6943?	163?	968?	0.058?	-
D	Discoverer 2 1959 γ	1959 Apr 13.89 12.7 days? 1959 Apr 26.6?	Cone-cylinder 1st day 743, then 650	6 long 1.5 dia	1959 Apr 13.9 1959 Apr 24.6	89.9 89.9	90.4 88.9	6671 6597	239 199	346 238	0.008 0.003	160 96
D	Explorer 6 1959 δ1	1959 Aug 7.60 23 months? 1961 Jul?	Spheroid + 4 vanes 64	Spheroid 0.74 long 0.66 dia	1959 Aug 7.6 1959 Oct 26.0 1959 Dec 19.2	47.0 47.0 47.0	765 760 754	27710 27590 27450	245 244 237	42400 42200 41900	0.761 0.760 0.759	35 53 65
D	Explorer 6 rocket 1959 δ2	1959 Aug 7.60 23 months? 1961 Jul?	Cylinder 24	1.5 long 0.46 dia	Orbit similar to 1959 δ1							
D	Discoverer 5 1959 ε1	1959 Aug 13.79 46 days 1959 Sep 28	Cone-cylinder 1st day 781, then 640	6 long 1.5 dia	1959 Aug 13.8 1959 Sep 9.1 1959 Sep 23.4	80.0 80.0 80.0	94.19 92.00 90.00	6856 6749 6651	217 209 193	739 533 353	0.038 0.024 0.012	157 70 22
D	Discoverer 5 capsule 1959 ε2	1959 Aug 13.79 547 days 1961 Feb 11	Paraboloid 140	0.6 long 0.9 dia	1960 Feb 15.1 1960 Dec 2.3 1961 Jan 31.3	78.94 78.94 78.94	104.27 94.45 90.68	7337 6869 6685	218 202 180	1700 779 434	0.101 0.042 0.019	47 320 124

Continued on page 4

	Name	Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D	Discoverer 6 1959 ζ	1959 Aug 19.81 62.0 days 1959 Oct 20.8	Cone-cylinder 1st day 793, then 640	6 long 1.5 dia	1959 Aug 19.9 1959 Sep 26.2 1959 Oct 12.7	84.0 84.0 84.0	95.27 92.00 90.00	6908 6749 6651	212 136 136	848 547 359	0.046 0.026 0.013	143 360 257
	Vanguard 3 1959 η	1959 Sep 18.22 200 years	Rocket-sphere-rod 45 Payload 23	2.5 long 0.51 dia	1959 Sep 18.3 1965 Jul 29.6 1967 Nov 25.8	33.35 33.32 33.35	130.0 129.74 129.55	8506 8482 8485	512 514 512	3744 3714 3702	0.190 0.188 0.188	133 166 8
D	Luna 3 1959 θ1	1959 Oct 4.1 177 days? 1960 Mar 29?	Ellipsoid 278.5	1.32 long 1.19 dia	1959 Oct 18.7 1959 Dec 22.5	73.8 82.9	22700 23300	264300 269300	40300 19700	476500 507400	0.824 0.903	182 186
	Explorer 7 1959 ε1	1959 Oct 13.65 70 years	Double cone 41.5	0.76 long 0.76 dia	1959 Oct 13.7 1965 Aug 4.5 1967 Nov 28.9	50.31 50.31 50.31	101.28 101.07 100.98	7200 7190 7187	556 553 550	1088 1070 1067	0.037 0.036 0.036	55 80 86
	Explorer 7 rocket 1959 ε2	1959 Oct 13.65 50 years	Cylinder 6	1.73 long 0.15 dia	1959 Oct 13.7 1977 May 1.0	50.30 50.30	101.25 99.75	7199 7126	554 540	1087 956	0.037 0.029	56 -
D	Discoverer 7 1959 κ	1959 Nov 7.85 19.0 days 1959 Nov 26.8	Cone-cylinder 1st day 734, then 660	6 long 1.5 dia	1959 Nov 7.9 1959 Nov 15.6 1959 Nov 20.8	81.64 81.6 81.6	94.70 92.9 91.5	6881 6793 6725	159 157 152	847 673 542	0.050 0.038 0.029	165 138 120
D	Discoverer 8 1959 λ	1959 Nov 20.81 108.24 days 1960 Mar 8.05	Cone-cylinder 1st day 735, then 660	6 long 1.5 dia	1959 Nov 20.9 1960 Jan 15.5 1960 Feb 29.5	80.65 80.6 80.6	103.72 98.00 92.00	7311 7040 6749	187 176 162	1679 1147 580	0.102 0.069 0.031	156 356 206

Space vehicles: Luna 1, 1959 μ; Pioneer 4, 1959 ν; Luna 2, 1959 ξ

A rocket separated from Luna 3, but its orbit is not known

Year of launch 1960

	Name	Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
	Tiros 1* 1960 β2	1960 Apr 1.49 100 years	Cylinder 120	0.48 long 1.07 dia	1960 Apr 1.5 1967 Nov 12.1	48.4 48.38	99.16 99.09	7100 7096	693 696	750 739	0.004 0.003	115 66
	Tiros 1 rocket 1960 β1	1960 Apr 1.49 50 years	Cylinder 24	1.5 long 0.46 dia	1960 Apr 1.5 1967 Oct 19.4	48.41 48.33	99.15 98.95	7099 7090	693 690	750 733	0.004 0.003	115 344
	Fragments 1960 β3,4											
D	Transit 1B 1960 γ2	1960 Apr 13.50 2730.75 days 1967 Oct 5.25	Sphere 121	0.91 dia	1960 Apr 13.5 1963 Nov 20.6 1966 Sep 24.8 1967 Sep 28.0	51.28 51.25 51.27 51.21	95.81 94.10 93.98 89.38	6939 6854 6806 6623	373 356 339 225	748 596 516 265	0.027 0.017 0.013 0.003	261 22 202 332
D	Transit 1B rocket 1960 γ1	1960 Apr 13.50 451.69 days 1961 Aug 18.19	Cylinder 600	4.8 long 1.4 dia	1960 Apr 13.5 1960 Dec 8.6 1961 Jun 16.8	51.25 51.25 51.25	95.25 93.21 91.05	6912 6813 6707	319 285 255	748 584 403	0.031 0.022 0.011	265 64 83
1d	Fragments 1960 γ3,4											
D	Discoverer 11 1960 δ	1960 Apr 15.85 10.88 days 1960 Apr 26.73	Cone-cylinder 1st day 790, then 660	6 long 1.5 dia	1960 Apr 16.9 1960 Apr 24.7	80.1 80.1	92.16 89.75	6757 6639	170 161	589 360	0.031 0.015	150 121

Space vehicle: Pioneer 5, 1960 α

* Television and infrarred observation satellite

Continued on page 6

	Name	Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D P	Sputnik 4* 1960 ε1	1960 May 15.00 844.41 days 1962 Sep 5.41	Double cone 2040 Payload 1477	2.5 long? 2.5 dia	1960 May 19.0 1961 Jun 29.4 1962 Jan 27.5 1962 Aug 5.8	65.02 65.02 65.02 64.95	94.25 92.53 91.44 89.50	6861 6777 6724 6628	290 284 272 224	675 514 420 277	0.028 0.017 0.011 0.004	87 270 183 94
D	Sputnik 4 rocket 1960 ε2	1960 May 15.00 63.82 days 1960 Jul 17.82	Cylinder 1440	3.8 long 2.6 dia	1960 May 15.0 1960 Jun 6.8 1960 Jul 15.5	64.89 64.89 64.89	91.25 90.79 88.69	6714 6692 6588	318 299 206	355 329 215	0.002 0.002 0.0005	63 53 37
D	Sputnik 4 cabin 1960 ε3	1960 May 15.00 1979.53 days 1965 Oct 15.53	Sphere 2500	2.4 dia	1960 May 19.0 1961 Jun 25.3 1962 Nov 25.8 1964 Aug 20.3	65.0 65.0 64.98 64.98	94.27 93.35 92.41 91.07	6862 6817 6771 6706	276 275 271 267	689 602 515 388	0.030 0.024 0.018 0.009	82 266 49 142
D	Fragments 1960 ε4-9											
D	Midas 2** 1960 ζ1	1960 May 24.73 5007.10 days 1974 Feb 7.83	Cylinder 2300	7 long 1.5 dia	1960 May 24.8 1965 Aug 18.6 1970 Nov 1.0	33.0 33.03 33.00	94.44 94.08 92.75	6876 6858 6794	484 469 409	511 491 422	0.002 0.002 0.001	136 232 -
D	Midas 2 nose-cap 1960 ζ2	1960 May 24.73 194.5 days 1960 Dec 5.3	Cone? 20?	2 long? 1.5 dia?	1960 May 24.8 1960 Oct 9.5 1960 Dec 2.6	33.00 33.00 33.00	94.44 93.02 89.79	6876 6807 6649	484 422 271	511 436 271	0.002 0.001 0	136 46 -

* The designation of the nine pieces of Sputnik 4 is that adopted in the United States. Russian and British prediction centres referred to Sputnik 4 as ε2 and the rocket as ε1. Between 1960 May 15.0 and May 19.0, satellite 1960 ε1 and 1960 ε3 to 9 were one piece, whose orbit was similar to that of 1960 ε2.

** Missile defence alarm system.

	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi-major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
	Transit 2A	1960η 1	1960 Jun 22.25 150 years	Sphere 101	0.91 dia	1960 Jun 22.3 1965 Aug 6.1	66.69 66.71	101.66 101.59	7216 7213	628 618	1047 1050	0.029 0.030	236 345
	Greb 1 (SR 1) *	1960η 2	1960 Jun 22.25 80 years	Sphere 19	0.51 dia	1960 Jun 22.3 1967 Nov 23.2	66.69 66.70	101.66 101.54	7216 7210	614 615	1061 1048	0.031 0.030	236 109
	Transit 2A rocket	1960η 3	1960 Jun 22.25 80 years	Cylinder 450	4.8 long 1.4 dia	1960 Jun 22.3 1961 Jun 27.6 1963 Mar 25.2	66.7 66.66 66.66	101.37 101.42 101.35	7202 7203 7201	615 615 614	1032 1034 1031	0.029 0.029 0.029	235 333 243
	Fragments	1960η4,5											
D r	Discoverer 13	1960 θ	1960 Aug 10.86 95.97 days 1960 Nov 14.83	Cone-cylinder 1st day 850, then 700	6 long 1.5 dia	1960 Aug 10.9 1960 Oct 9.9 1960 Nov 9.4	82.85 82.85 82.85	94.04 92.00 90.00	6849 6749 6651	258 250 226	683 493 319	0.031 0.018 0.007	154 295 178
D	Echo 1	1960ι 1	1960 Aug 12.40 2841.53 days 1968 May 24.03	Inflated sphere 75.9 initially; 62 after Jan 1961	30 dia	1960 Aug 12.4 1960 Dec 16.0 1961 Jun 20.0 1961 Dec 6.0 1962 Nov 20.0 1963 Sep 4 1965 Jun 24.9 1967 Nov 28.5	47.22 47.27 47.20 47.30 47.20 47.29 47.30 47.26	118.22 117.28 117.03 116.18 115.35 114.82 113.33 108.50	7982 7940 7929 7890 7854 7827 7763 7539	1524 966 1550 904 842 571 888 844	1684 2157 1550 2120 2010 1926 1882 1477	0.010 0.075 0 0.077 0.068 0.061 0.064 0.042	14 59 - 78 97 264 238 303
	Echo 1 rocket	1960ι 2	1960 Aug 12.40 10000 years	Cylinder 24	1.5 long 0.46 dia	1960 Aug 12.4 1963 Dec 3.0	47.23 47.23	117.98 117.98	7972 7971	1502 1501	1685 1684	0.011 0.011	12 8
	Fragments	1960ι 3-5											

* Solar Radiation.

Continued on Page 8

	Name	Launch date, lifetime and discent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D r	Discoverer 14 1960 κ	1960 Aug 18.83 28.19 days 1960 Sep 16.02	Cone-cylinder 1st day 850, then 700	6 long 1.5 dia	1960 Aug 18.9 1960 Aug 30.8 1960 Sep 10.1	79.65 79.65 79.65	94.55 93.00 91.00	6874 6758 6701	186 182 175	805 658 470	0.045 0.035 0.022	168 129 94
D R B	Sputnik 5 1960 λ1	1960 Aug 19.36 1.1 days 1960 Aug 20.5	Sphere-cylinder 4600	4.3 long 2.4 dia	1960 Aug 19.4	64.95	90.72	6688	297	324	0.002	60
D	Sputnik 5 1960 λ2 rocket	1960 Aug 19.36 35.21 days 1960 Sep 23.57	Cylinder 1440	3.8 long 2.6 dia	1960 Aug 19.4 1960 Sep 10.0 1960 Sep 19.9	64.9 64.9 64.9	90.70 90.0 89.0	6687 6653 6604	296 268 225	323 282 226	0.002 0.001 0	81 72 67
D	Discoverer 15 1960 μ	1960 Sep 13.93 34.2 days 1960 Oct 18.1	Cone-cylinder 1st day 863, then 710	6 long 1.5 dia	1960 Sep 14.0 1960 Oct 3.0 1960 Oct 14.0	80.90 80.90 80.90	94.23 92.00 90.00	6858 6749 6651	199 196 180	761 547 366	0.041 0.026 0.014	162 96 55
	Courier 1B 1960 ν1	1960 Oct 4.74 1000 years	Sphere 230	1.30 dia	1960 Oct 4.8 1965 Nov 8.4	28.33 28.32	106.85 106.86	7465 7466	938 968	1237 1207	0.020 0.016	41 306
	Courier 1B 1960 ν2 rocket	1960 Oct 4.74 500 years	Cylinder 450	4.8 long 1.4 dia	1960 Oct 4.8 1967 Jul 3.2	28.30 28.24	106.38 106.37	7444 7443	946 923	1184 1206	0.016 0.019	41 133
	Explorer 8 1960 ξ1	1960 Nov 3.22 50 years	Double cone 41	0.76 long 0.76 dia	1960 Nov 3.3 1967 Nov 22.0	49.95 49.94	112.69 111.82	7731 7692	417 421	2288 2206	0.121 0.116	52 110
	Explorer 8 1960 ξ2 rocket	1960 Nov 3.22 30 years	Cylinder 5	1.73 long 0.15 dia	1960 Nov 3.3 1969 Sep 16.0	49.96 49.95	112.68 109.60	7731 7590	417 415	2288 2009	0.121 0.105	52 -
D	Fragments 1960 ξ3,4											

	Name	Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D r	Discoverer 17 1960o	1960 Nov 12.86 46.9 days 1960 Dec 29.8	Cone-cylinder 1st 2 days 1091 then 930	8 long 1.5 dia	1960 Nov 12.9 1960 Dec 13.2 1960 Dec 25.3	81.70 81.70 81.70	96.45 93.11 90.35	6965 6804 6668	190 184 170	984 668 410	0.057 0.036 0.018	163 59 15
	Tiros 2 1960π1	1960 Nov 23.47 60 years	Cylinder 130	0.48 long 1.07 dia	1960 Nov 23.5 1967 Nov 18.9	48.5 48.52	98.20 98.11	7054 7049	619 614	732 727	0.008 0.008	334 185
	Tiros 2 rocket 1960π2	1960 Nov 23.47 30 years	Cylinder 24	1.5 long 0.46 dia	1960 Nov 23.5 1977 May 1.0	48.57 48.5	98.14 97.02	7051 6997	609 579	736 659	0.009 0.006	334 -
	Fragments * 1960π3-5											
D B	Sputnik 6 1960ρ1	1960 Dec 1.31 1 day 1960 Dec 2	Sphere-cylinder 4563	4.3 long 2.4 dia	1960 Dec 1.4	64.97	88.47	6577	166	232	0.005	60?
D	Sputnik 6 rocket 1960ρ2	1960 Dec 1.31 1.6 days 1960 Dec 2.9	Cylinder 1440	3.8 long 2.6 dia	1960 Dec 2.8	65.00	87.29	6518	140	140	0	-
D r	Discoverer 18 1960σ	1960 Dec 7.85 115.9 days 1961 Apr 2.8	Cone-cylinder 1st 3 days 1240 then 950?	8 long 1.5 dia	1960 Dec 7.9 1961 Feb 5.8 1961 Mar 29.0	81.50 81.48 81.48	93.66 92.0 89.49	6830 6749 6626	243 233 205	661 510 291	0.031 0.021 0.006	164 312 121
D	Discoverer 19 1960τ	1960 Dec 20.86 33.2 days 1961 Jan 23.1	Cone-cylinder 1060	8 long 1.5 dia	1960 Dec 20.9 1961 Jan 16.6 1961 Jan 19.1	83.40 83.40 83.40	93.00 90.0 89.55	6798 6651 6629	209 186 178	631 359 324	0.031 0.013 0.011	173 75 62

* The fragment 1960π5, designated on 31 Mar 1972, probably belongs to a different launch (perhaps Echo 1).

	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D	Samos 2 *	1961 α 1	1961 Jan 31.85 4646 days 1973 Oct 21	Cylinder 1900	7 long 1.5 dia	1961 Jan 31.9 1965 Dec 12.5 1967 Nov 28.5 1970 Nov 1.0	97.40 97.39 97.34 97.3	94.97 94.73 94.40 93.24	6894 6882 6869 6811	474 463 456 412	557 545 525 454	0.006 0.006 0.005 0.003	196 112 110 -
D	Samos 2 nose-cap	1961 α 2	1961 Jan 31.85 3537.37 days 1970 Oct 9.22	Cone? 200?	2 long? 1.5 dia?	1961 Jan 31.9 1967 Aug 30.9 1969 Sep 16.0	97.40 97.36 97.30	94.97 94.25 93.02	6894 6861 6800	474 448 404	557 517 440	0.006 0.005 0.003	196 55 -
D	Sputnik 7**	1961 β 1	1961 Feb 4.1 22.7 days 1961 Feb 26.8	Cylinder 6483 full	7 long? 2.0 max dia	1961 Feb 4.1	64.95	89.78	6643	212	318	0.008	59
D	Sputnik 7 rocket	1961 β 2	1961 Feb 4.1 8.9 days 1961 Feb 13.0	Cylinder 2500?	7.5 long 2.6 dia	Initial orbit similar to 1961 β 1							
D	Fragment	1961 β 3											
	Venus 1	1961 γ 1	1961 Feb 12.09 indefinite	Cylinder 643.5	2.03 long 1.05 dia	Initial earth-satellite orbit similar to 1961 γ 3							
D	Sputnik 8 rocket	1961 γ 2	1961 Feb 12.09 6.5 days 1961 Feb 18.6	Cylinder 2500?	7.5 long 2.6 dia	1961 Feb 13.9	65.0	89.21	6614	196	275	0.006	20
D	Sputnik 8	1961 γ 3	1961 Feb 12.09 13.7 days 1961 Feb 25.8	Irregular	2 long? 2 dia?	1961 Feb 12.1	65.0	89.61	6633	229	282	0.004	23
D	Fragment	1961 γ 4											

* Satellite and missile observation system.

** Sputnik 7 is believed to be a Venus Probe launcher.

	Name	Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D	Explorer 9 1961 δ1	1961 Feb 16.55 1148.2 days 1964 Apr 9.8	Inflated sphere 6.63	3.66 dia	1961 Feb 16.6 1961 Dec 19.0 1963 Jan 1.0 1963 Dec 7.9	38.86 38.82 38.86 38.95	118.28 118.04 117.36 112.11	7986 7976 7947 7704	634 752 632 394	2583 2443 2506 2258	0.122 0.106 0.118 0.121	100 118 134 26
	Explorer 9 1961 δ2 rocket	1961 Feb 16.55 150 years	Cylinder 24	1.5 long 0.46 dia	1961 Feb 16.6	38.85	118.40	7992	639	2589	0.122	100
2d	Fragments 1961 δ3-8											
D	Discoverer 20 1961 ε1	1961 Feb 17.85 525.9 days 1962 Jul 28.7	Cone-cylinder 1st 4 days 1110 then 980	8 long 1.5 dia	1961 Feb 17.9 1962 Jan 27.2 1962 Jul 12.4	80.91 80.84 80.82	95.41 92.78 89.91	6915 6787 6641	288 267 223	786 552 303	0.036 0.021 0.006	125 36 158
D	Fragments 1961 ε 2-4											
D	Discoverer 21 1961 ζ	1961 Feb 18.95 426.0 days 1962 Apr 20.9	Cone-cylinder 1100?	8 long 1.5 dia	1961 Feb 19.0 1961 Dec 17.5 1962 Apr 9.8	80.74 80.68 80.64	97.85 93.49 90.19	7033 6822 6656	240 239 212	1069 649 344	0.059 0.030 0.010	141 244 198
D	Transit 3B- 1961 η Lofti 1 *	1961 Feb 22.16 36.38 days 1961 Mar 30.54	Cylinder 600	6.5 long 1.4 dia	1961 Feb 22.2 1961 Mar 26.0	28.38 28.38	96.22 90.67	6963 6693	167 147	1002 482	0.060 0.025	29 29
D R B	Sputnik 9 1961 θ1	1961 Mar 9.27 0.07 day 1961 Mar 9.34	Sphere-cylinder 4700	4.3 long 2.4 dia	1961 Mar 9.3	64.93	88.60	6584	173	239	0.005	-
D	Sputnik 9 1961 θ2 rocket	1961 Mar 9.27 1.1 days 1961 Mar 10.4	Cylinder 1440	3.8 long 2.6 dia	1961 Mar 9.6	64.9	88.20	6564	173	199	0.002	25
D	Fragments 1961 θ 3,4											

* Low-frequency trans-ionospheric satellite

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	Name	Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D R B	Sputnik 10 1961 ι 1	1961 Mar 25.25 0.07 day 1961 Mar 25.32	Sphere-cylinder 4695	4.3 long 2.4 dia	1961 Mar 25.3	64.9	88.42	6575	164	230	0.005	-
D	Sputnik 10 1961 ι 2 rocket	1961 Mar 25.25 1.7 days 1961 Mar 26.9	Cylinder 1440	3.8 long 2.6 dia	1961 Mar 25.9	65.0	87.80	6544	140	192	0.004	42
D	Fragment 1961 ι 3											
D	Explorer 10 1961 κ	1961 Mar 25.64 87 months 1968 Jun	Sphere-cylinder 35	2.72 long 0.48 dia	1961 Mar 25.7	33	5013	97050	221	181100	0.932	-
D	Discoverer 23 1961 λ 1	1961 Apr 8.75 373.1 days 1962 Apr 16.9	Cone-cylinder 1st 3 days 1150 then 950?	8 long 1.5 dia	1961 Apr 9.0 1961 Jul 2.4 1962 Jan 18.6	82.31 82.31 82.26	94.09 93.52 91.68	6851 6823 6734	295 295 268	651 595 443	0.026 0.022 0.013	168 227 224
D	Discoverer 23 1961 λ 2 capsule	1961 Apr 8.75 409.4 days 1962 May 23.2	Paraboloid 150?	0.6 long 0.9 dia	1961 Apr 24.9 1962 Feb 2.5 1962 May 8.5	81.94 81.88 81.82	101.49 95.03 90.04	7206 6897 6648	208 194 180	1448 843 359	0.086 0.047 0.013	112 290 307
D	Discoverer 23 1961 λ 3 capsule rocket	1961 Apr 8.75 154.8 days 1961 Sep 10.6	Frustum 50?	0.6 long? 0.9 dia ?	1961 Apr 24.9 1961 Jul 4.8 1961 Aug 29.8	81.94 81.94 81.87	101.13 97.19 91.96	7189 7001 6747	200 196 187	1422 1050 551	0.085 0.061 0.027	111 249 53

A rocket is believed to have separated from Explorer 10. From 1961 Apr 8 to Apr 11 satellites 1961 λ2 and 1961 λ3 were part of 1961 λ1.

	Name	Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D R M	Vostok 1 1961 μ 1	1961 Apr 12.25 108 min 1961 Apr 12.33	Sphere-cylinder 4725	4.3 long 2.4 dia	1961 Apr 12.3	64.95	89.34	6620	169	315	0.011	-
D	Vostok 1 rocket 1961 μ 2	1961 Apr 12.25 4.2 days 1961 Apr 16.5	Cylinder 1440	**3.8 long** **2.6 dia**	1961 Apr 12.6	65.07	89.31	6618	161	320	0.012	100
	Explorer 11 1961 ν 1	1961 Apr 27.59 150 years	Cylinder 37	2.26 long 0.38 dia	1961 Apr 27.6 **1965 Aug 8.2**	28.80 **28.77**	107.84 **107.76**	7512 **7508**	487 **484**	1779 **1775**	0.086 **0.086**	119 **167**
	Fragment 1961 ν 2											
D r	Discoverer 25 1961 ξ 1	1961 Jun 16.96 25 days 1961 Jul 12	Cone-cylinder 1st 2 days 1150 then 950?	8 long 1.5 dia	1961 Jun 17.1 1961 Jul 11.3	82.11 82.11	90.87 88.29	6634 6567	222 175	409 201	0.014 0.002	178 84
D	Fragment 1961 ξ 2											
	Transit 4A 1961 o 1	1961 Jun 29.18 600 years	Cylinder 79	0.79 long 1.09 dia	1961 Jun 29.2	66.81	103.82	7317	881	998	0.008	319
	Greb 3-Injun1 1961 o 2 (SR 3)	1961 Jun 29.18 900 years	Sphere-cylinder 25-16	0.9 long 0.51 dia	1961 Jun 29.2	66.82	103.85	7319	882	999	0.008	318
350	Fragments* 1961 o3-256											
D r	Discoverer 26 1961 π	1961 Jul 7.98 150.4 days 1961 Dec 5.4	Cone-cylinder 1st 2 days 1150 then 950?	8 long 1.5 dia	1961 Jul 8.3 1961 Sep 18.4 1961 Nov 21.3	82.94 82.94 82.94	95.02 93.14 90.39	6896 6805 6670	228 223 212	808 631 372	0.042 0.030 0.012	160 260 18

* Ablestar rocket exploded shortly after entering orbit.

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	Name	Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
	Tiros 3 1961 ρ 1	1961 Jul 12.43 150 years	Cylinder 129	0.48 long 1.07 dia	1961 Jul 12.5 1965 Aug 6.4	47.90 47.90	100.33 100.32	7156 7155	735 740	820 812	0.006 0.005	42 82
	Tiros 3 rocket 1961 ρ 2	1961 Jul 12.43 75 years	Cylinder 24	1.5 long 0.46 dia	1961 Jul 12.5 1967 Jul 8.6	47.9 47.91	100.31 100.20	7154 7150	740 736	812 808	0.005 0.005	42 317
	Fragments 1961 ρ 3,4											
	Midas 3 1961 σ 1	1961 Jul 12.68 100000 years	Cylinder 1600	9 long 1.5 dia	1961 Jul 12.7 1962 Oct 12.9	91.2 91.19	161.54 161.52	9824 9820	3358 3340	3534 3544	0.009 0.010	240 95
D	Midas 3 nose-cap 1961 σ 2	1961 Jul 12.68 13.20 days 1961 Jul 25.88	Cone 20?	2 long? 1.5 dia?	1961 Jul 15.4 1961 Jul 18.5	90.80 90.80	117.25 109.7	7934 7589	138 134	2974 2289	0.179 0.142	164 -
1d	Fragments 1961 σ 3-5											
D R M	Vostok 2 1961 τ 1	1961 Aug 6.25 25.3 hours 1961 Aug 7.30	Sphere-cylinder 4730	4.3 long 2.4 dia	1961 Aug 6.3	64.93	88.46	6577	166	232	0.005	-
D	Vostok 2 rocket 1961 τ 2	1961 Aug 6.25 3 days 1961 Aug 9	Cylinder 1440	3.8 long 2.6 dia	Orbit similar to 1961 τ1							
D	Explorer 12* 1961 υ	1961 Aug 16.14 25 months 1963 Sep	Octagon + 4 vanes 38	1.29 long 0.66 dia	1961 Sep 22.5 1962 Jan 30.5	33.1 33.43	1591 1587.3	45190 45086	314 790	77310 76620	0.852 0.841	- -
D	Ranger 1 1961 φ 1	1961 Aug 23.46 6.89 days 1961 Aug 30.35	Cylinder 306	3.5 long 1.5 dia	1961 Aug 24.1 1961 Aug 29.5	32.9 32.9	90.64 88.9	6691 6605	179 174	446 280	0.020 0.008	206 -
D	Ranger 1 rocket 1961 φ 2	1961 Aug 23.46 10.68 days 1961 Sep 3.14	Cylinder 700?	6 long? 1.5 dia	1961 Aug 24.1 1961 Aug 29.5	32.93 32.93	90.71 89.7	6694 6644	175 173	456 359	0.021 0.014	206 -

* A rocket is believed to have separated from Explorer 12.

	Name	Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D	Explorer 13 1961 χ	1961 Aug 25.81 2.3 days 1961 Aug 28.1	Cylinder 86	1.93 long 0.61 dia	1961 Aug 26.8	37.7	97.5	7023	125	1164	0.074	-
D r B	Discoverer 29 1961 ψ	1961 Aug 30.8 10.2 days 1961 Sep 9.98	Cone-cylinder 1150, then 950?	8 long 1.5 dia	1961 Aug 31.3	82.14	91.51	6725	152	542	0.029	83
D r	Discoverer 30 1961 ω 1	1961 Sep 12.83 90.1 days 1961 Dec 11.9	Cone-cylinder 1150, then 950?	8 long 1.5 dia	1961 Sep 13.6 1961 Nov 21.5 1961 Dec 5.5	82.66 82.66 82.66	92.40 90.4 89.4	6769 6671 6621	235 213 204	546 373 283	0.023 0.012 0.006	142 - -
D	Fragments 1961 ω 2,3											
D R	Mercury 4 1961 $\alpha\alpha$ 1	1961 Sep 13.59 109 min 1961 Sep 13.66	Cone-frustum 1200	2.90 long 1.83 dia	1961 Sep 13.6	32.8	88.40	6580	156	248	0.007	-
D	Mercury 4 1961 $\alpha\alpha$ 2 rocket	1961 Sep 13.59 5 hours 1961 Sep 13.8	Cylinder 3400	20 long 3.0 dia	1961 Sep 13.6	32.85	87.3	6526	147	147	0	-
D	Discoverer 31 1961 $\alpha\beta$	1961 Sep 17.88 38.57 days 1961 Oct 26.45	Cone-cylinder 1100?	8 long 1.5 dia	1961 Sep 21.0 1961 Oct 10.5	82.70 82.7	90.86 90.0	6693 6651	235 220	396 326	0.012 0.008	136 -
D r	Discoverer 32 1961 $\alpha\gamma$ 1	1961 Oct 13.81 30.6 days 1961 Nov 13.4	Cone-cylinder 1st day 1150 then 950?	8 long 1.5 dia	1961 Oct 14.1 1961 Nov 10.3	81.69 81.64	90.84 88.93	6692 6598	234 207	395 233	0.012 0.002	158 60
D	Fragments 1961 $\alpha\gamma$ 2,3											

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	Name	Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
	Midas 4 1961αδ1	1961 Oct 21.58 100000 years	Cylinder 1800?	9 long? 1.5 dia	1961 Nov 2.0	95.89	166.01	10004	3496	3756	0.013	18
1d	Fragments 1961αδ 2-6											
D	Discoverer 34 1961αε1	1961 Nov 5.83 396.4 days 1962 Dec 7.2	Cone-cylinder 1100?	8 long 1.5 dia	1961 Nov 6.1 1962 Jun 5.3 1962 Nov 24.7	82.52 82.46 82.46	97.12 94.40 89.91	6998 6863 6642	227 220 196	1011 750 332	0.056 0.039 0.010	152 149 246
D	Fragments 1961αε 2-5											
D r	Discoverer 35 1961αζ1	1961 Nov 15.89 17.9 days 1961 Dec 3.8	Cone-cylinder 1st day 1150 then 950?	8 long 1.5 dia	1961 Nov 21.5 1961 Dec 2.5	81.63 81.63	89.7 88.2	6636 6562	238 177	278 190	0.003 0.001	- -
D	Fragment 1961αζ2											
	Transit 4B 1961αη1	1961 Nov 15.93 1000 years	Cylinder 86	0.79 long 1.09 dia	1961 Nov 16.6	32.43	105.63	7408	956	1104	0.010	329
	Traac * 1961αη2	1961 Nov 15.93 800 years	"Door-knob" + 32m boom 109	1.0 long 1.09 dia	1961 Nov 21.5	32.43	105.64	7409	941	1119	0.012	-
	Transit 4B 1961αη3 rocket	1961 Nov 15.93 500 years	Cylinder 450?	4.8 long 1.4 dia	1961 Nov 21.5	32.41	105.49	7402	942	1105	0.011	-

* Transit research and attitude control.

	Name	Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D	Ranger 2 1961 αθ	1961 Nov 18.34 2 days 1961 Nov 20	Cylinder 1300?	11 long? 1.5 dia	1961 Nov 18.4 1961 Nov 19.3	33.34 33.34	88.28 87.51	6574 6536	150 145	242 171	0.007 0.002	49 59
D R B	Mercury 5 1961αι 1	1961 Nov 29.63 3.3 hours 1961 Nov 29.77	Cone-frustum 1300	2.90 long 1.83 dia	1961 Nov 29.7	32.6	88.31	6575	158	237	0.006	127
D	Mercury 5 rocket 1961αι 2	1961 Nov 29.63 1 day 1961 Nov 30	Cylinder 3400	20 long 3.0 dia	Orbit similar to 1961αι 1							
D r	Discoverer 36 1961ακ 1	1961 Dec 12.86 85.3 days 1962 Mar 8.2	Cone-cylinder 1st 4 days 1150 then 950?	8 long 1.5 dia	1961 Dec 14.7 1962 Jan 30.5 1962 Feb 27.5	81.21 81.21 81.15	91.82 90.85 89.60	6741 6691 6636	241 229 218	484 396 298	0.018 0.012 0.006	134 - -
D	Oscar 1 * 1961ακ 2	1961 Dec 12.86 49.4 days 1962 Jan 31.3	Rectangular box 5	0.30 long 0.25 wide 0.15 high	1961 Dec 14.0 1962 Jan 16.5 1962 Jan 30.5	81.21 81.21 81.21	91.76 90.4 88.2	6738 6671 6562	245 226 164	474 359 204	0.017 0.010 0.003	137 - -
D	Fragment 1961ακ 3											
D	[Atlas Agena B] 1961αλ 1	1961 Dec 22.80 235 days 1962 Aug 14	Cylinder 1800?	8 long? 1.5 dia	1962 Mar 13.5 1962 Jun 5.6 1962 Aug 3.6	89.6 89.6 89.6	94.1 92.1 89.6	6851 6754 6628	244 228 201	702 524 299	0.033 0.022 0.007	- - -
D	Fragments 1961αλ 2, 3											

* Orbiting satellite carrying amateur radio.

	Name	Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
	Tiros 4 1962 β 1	1962 Feb 8.52 150 years	Cylinder 129	0.48 long 1.07 dia	1962 Feb 13.5	48.30	100.31	7154	712	840	0.009	-
	Tiros 4 rocket 1962 β 4	1962 Feb 8.52 75 years	Cylinder 24	1.5 long 0.46 dia	1965 Aug 7.8	48.24	100.21	7150	700	843	0.010	312
	Fragments 1962 β 2,3											
D R M	Mercury 6 (Friendship 7) 1962 γ 1	1962 Feb 20.62 296 min 1962 Feb 20.82	Cone-frustum 1352	2.90 long 1.83 dia	1962 Feb 20.7	32.54	88.60	6590	159	265	0.008	80
D P	Mercury 6 rocket 1962 γ 2	1962 Feb 20.62 8 hours 1962 Feb 20.9	Cylinder 3400	20 long 3.0 dia	1962 Feb 20.8	32.57	88.00	6560	156	208	0.004	84
D r?	[Thor Agena B] 1962 δ	1962 Feb 21 16 days 1962 Mar 9	Cylinder 1000?	8 long? 1.5 dia	1962 Feb 21	81.97	90.0	6649	167	374	0.016	-
D r	Discoverer 38 1962 ε 1	1962 Feb 27.91 21 days 1962 Mar 21	Cone-cylinder 1st 4 days 1150 then 950?	8 long 1.5 dia	1962 Mar 9.8 1962 Mar 13.5	82.23 82.23	90.04 89.71	6653 6636	208 208	341 308	0.010 0.008	98 -
D	Fragments 1962 ε 2-4											
	OSO 1 * 1962 ζ 1	1962 Mar 7.67 20 years	Nonagonal box 208	0.94 long 1.12 dia	1962 Jul 15.5 1971 Mar 16.5	32.83 32.83	95.99 95.28	6952 6916	553 522	595 553	0.003 0.002	77 -
D	OSO 1 rocket 1962 ζ 2	1962 Mar 7.67 2978.60 days 1970 May 3.27	Cylinder 24	1.5 long 0.46 dia	1962 Mar 18.3 1967 Dec 15.5 1969 Sep 16.0	32.83 32.83 32.83	95.98 95.28 93.74	6950 6917 6839	544 523 453	600 552 468	0.004 0.002 0.001	203 - -

Space vehicle: Ranger 3, 1962 α1; and rocket 1962 α2.

* Orbiting Solar Observatory.

	Name	Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D	[Atlas Agena B] 1962 η 1	1962 Mar 7.8 457.1 days 1963 Jun 7.9	- 500?	1.5 dia?	1962 Mar 13.5 1963 Jan 5.7 1963 May 28.7	90.89 90.87 90.86	93.9 91.57 88.85	6842 6723 6600	251 223 189	676 467 255	0.031 0.018 0.005	- 2 104
D	Agena rocket 1962 η 3	1962 Mar 7.8 240.6 days 1962 Nov 3.4	Cylinder 700?	6 long? 1.5 dia	1962 May 1.6 1962 Jul 6.6 1962 Oct 24.6	90.87 90.87 90.87	93.3 92.4 89.6	6813 6769 6630	250 228 209	618 553 294	0.027 0.024 0.006	- - -
D	Fragment 1962 η 2											
D	Cosmos 1 (Sputnik 11) 1962 θ 1	1962 Mar 16.50 70 days 1962 May 25	Ellipsoid 200?	1.8 long 1.2 dia	1962 Mar 16.6 1962 May 1.6 1962 May 25	49.00 48.99 48.99	96.35 92.70 87.9	6964 6788 6552	204 194 173	967 626 175	0.055 0.032 0	104 309 -
D	Cosmos 1 rocket 1962 θ 2	1962 Mar 16.50 94 days 1962 Jun 18	Cylinder 1500?	8 long 1.65 dia	1962 Mar 19.8 1962 May 17.5 1962 Jun 5.6	49.0 49.0 49.0	96.10 92.60 91.00	6953 6783 6705	206 202 186	943 609 468	0.053 0.030 0.021	118 - 108
D	Cosmos 2 (Sputnik 12) 1962 ι 1	1962 Apr 6.72 499.3 days 1963 Aug 20.0	Ellipsoid 400?	1.8 long 1.2 dia	1962 Apr 7 1962 Dec 22.0 1963 Jul 28.3	48.97 48.94 48.90	102.25 97.17 90.61	7246 7006 6686	202 195 187	1535 1060 428	0.092 0.062 0.018	- 49 306
D	Cosmos 2 rocket 1962 ι 2	1962 Apr 6.72 182.7 days 1962 Oct 6.4	Cylinder 1500?	8 long 1.65 dia	1962 Apr 10.1 1962 Jul 16.4 1962 Oct 3.1	48.94 48.91 48.85	101.90 96.69 89.92	7230 6982 6652	215 191 169	1488 1015 379	0.088 0.059 0.016	119 147 141
	Midas 5 [Atlas Agena B] 1962 κ 1	1962 Apr 9.66 100000 years	Cylinder 2000?	9 long? 1.5 dia	1962 May 1.6	86.68	153.03	9476	2814	3382	0.030	-
3d	Fragments 1962 κ 2-6											
D	[Thor Agena B] 1962 λ 1	1962 Apr 18 40 days 1962 May 28	Cylinder 1500?	8 long? 1.5 dia	1962 May 1.6 1962 May 17.5	73.48 73.45	90.9 89.5	6699 6626	200 198	441 297	0.018 0.007	- -
D	Fragments 1962 λ 2-4											

Space vehicle: Ranger 4, 1962 μ1; and rocket 1962 μ2

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	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D	Cosmos 3 (Sputnik 13)	1962 ν 1	1962 Apr 24.17 176 days 1962 Oct 17	Ellipsoid 400?	1.8 long 1.2 dia	1962 Apr 24.2 1962 Jul 18.3 1962 Oct 10.3	48.99 48.97 48.95	93.75 92.43 89.37	6840 6775 6625	216 214 193	707 580 301	0.036 0.027 0.008	- 126 170
D	Cosmos 3 rocket	1962 ν 2	1962 Apr 24.17 103.6 days 1962 Aug 5.8	Cylinder 1500?	8 long 1.65 dia	1962 Apr 26.4 1962 Jul 11.9 1962 Jul 29.0	49.00 48.98 48.96	93.71 90.98 89.79	6837 6704 6644	220 212 209	699 440 323	0.035 0.017 0.009	109 101 183
D R B	Cosmos 4 (Sputnik 14)	1962 ξ 1	1962 Apr 26.42 3.0 days 1962 Apr 29.4	Sphere-cylinder 4750?	4.3 long 2.4 dia	1962 Apr 26.5	65.00	90.53	6679	285	317	0.002	-
D	Cosmos 4 rocket	1962 ξ 2	1962 Apr 26.42 52.5 days 1962 Jun 17.9	Cylinder 1440	3.8 long 2.6 dia	1962 Apr 30.4 1962 Jun 8.9 1962 Jun 15.6	64.95 64.94 64.92	90.52 89.28 88.60	6679 6615 6584	287 233 205	314 240 207	0.002 0.001 0	174 146 -
D	Fragment	1962 ξ 3											
D	Ariel 1	1962 ο 1	1962 Apr 26.75 5142.1 days 1976 May 24.9	Cylinder + 4 paddles 60	0.53 long 0.58 dia	1962 Apr 28.5 1969 Sep 16.0 1970 Dec 1.0	53.85 53.85 53.85	100.86 98.10 96.80	7180 7046 6984	389 377 368	1214 959 844	0.057 0.041 0.034	173 - -
D	Ariel 1 rocket	1962 ο 2	1962 Apr 26.75 3288.83 days 1971 Apr 26.58	Cylinder 24	1.5 long 0.46 dia	1962 May 17.5 1967 Sep 27.7 1969 Sep 16.0	53.84 53.85 53.84	100.91 99.19 96.71	7182 7099 6960	394 384 367	1213 1058 836	0.057 0.047 0.034	- 47 -
D	[Atlas Agena B]	1962 π	1962 Apr 26.9 2 days 1962 Apr 28	Cylinder 2000?	8 long? 1.5 dia	1962 Apr 27	74.1?	90?					
D	[Thor Agena B]	1962 ρ 1	1962 Apr 28.95 28 days 1962 May 26	Cylinder 1500?	8 long? 1.5 dia	1962 May 1.6 1962 May 17.6 1962 May 25.6	73.11 73.07 73.07	91.1 89.90 88.7	6706 6647 6588	180 176 166	475 362 253	0.022 0.014 0.007	- 94 -
D	Fragment	1962 ρ 2											

	Name	Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min.)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D	[Thor Agena B] 1962σ1	1962 May 15.82 560.0 days 1963 Nov 26.8	Cylinder 1500?	8 long? 1.5 dia	1962 May 20.6 1962 Dec 11.7 1963 Oct 17.5	82.33 82.33 82.32	94.02 93.03 90.55	6848 6795 6680	305 287 248	634 546 355	0.024 0.019 0.008	148 131 56
D	Fragments 1962σ2,3											
D R M	Mercury 7 (Aurora 7) 1962τ1	1962 May 24.53 296 min 1962 May 24.74	Cone-frustum 1349	2.90 long 1.83 dia	1962 May 24.6	32.5	88.50	6585	154	260	0.008	-
D	Mercury 7 rocket 1962τ2	1962 May 24.53 1 day 1962 May 25	Cylinder 3400	20 long 3.0 dia	Orbit similar to 1962τ1							
D	Cosmos 5 (Sputnik 15) 1962υ1	1962 May 28.13 339.6 days 1963 May 2.7	Ellipsoid with 'hat' 400?	1.8 long 1.2 to 1.5 dia	1962 May 28.2 1962 Nov 28.8 1963 Mar 15.1	49.06 49.00 48.96	102.68 97.41 93.50	7267 7019 6826	190 187 184	1587 1095 712	0.096 0.065 0.039	112 104 205
D	Cosmos 5 rocket 1962υ2	1962 May 28.13 201 days 1962 Dec 15	Cylinder 1500?	8 long 1.65 dia	1962 May 29.5 1962 Sep 4.3 1962 Nov 24.5	49.1 49.01 48.98	102.67 99.06 92.80	7266 7096 6792	205 194 161	1571 1242 647	0.094 0.074 0.034	116 129 113
D	[Thor Agena B] 1962φ1	1962 May 30.02 12 days 1962 Jun 11	Cylinder 1500?	8 long? 1.5 dia	1962 Jun 5.5 1962 Jun 8.3	74.10 74.10	89.70 88.96	6637 6599	199 193	319 248	0.009 0.004	- 1
D	Fragment 1962φ2											

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	Name	Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D	[Thor Agena B] 1962 χ 1	1962 Jun 2.03 26.9 days 1962 Jun 28.9	Cylinder 1500?	8 long? 1.5 dia	1962 Jun 5.5 1962 Jun 19.5 1962 Jun 25.4	74.26 74.25 74.25	90.50 89.60 88.87	6676 6632 6596	211 193 188	385 315 247	0.013 0.009 0.004	- 91 75
D	Oscar 2 1962 χ 2	1962 Jun 2.03 19 days 1962 Jun 21	Rectangular box 5	0.30 long 0.25 wide 0.15 high	1962 Jun 2.9 1962 Jun 15.6	74.27 74.27	90.55 89.30	6679 6617	207 193	394 285	0.014 0.007	133 -
D	Fragment 1962 χ 3											
D	[Atlas Agena B] 1962 ψ	1962 Jun 17 1 day 1962 Jun 18	Cylinder 2000?	8 long? 1.5 dia	Orbit unknown							
D	[Thor Agena B] 1962 ω 1	1962 Jun 18.85 498.1 days 1963 Oct 30.0	Cylinder 1500?	8 long? 1.5 dia	1962 Jun 22.6 1962 Dec 17.7 1963 Oct 26.8	82.14 82.12 82.10	92.49 91.86 88.69	6769 6738 6583	370 344 198	411 375 211	0.003 0.002 0.001	- 50 336
D	Fragments 1962 ω 2,3											
	Tiros 5 1962 αα 1	1962 Jun 19.51 100 years	Cylinder 129	0.56 long 1.07 dia	1962 Jul 13.4	58.08	100.44	7159	588	974	0.027	121
	Tiros 5 rocket 1962 αα 2	1962 Jun 19.51 50 years	Cylinder 24	1.5 long 0.46 dia	1962 Jul 17.5 1969 Sep 16.0	58.08 58.08	100.40 100.02	7157 7138	586 590	972 930	0.027 0.024	- -
1d	Fragments 1962 αα 3-5											
D	[Thor Agena B] 1962 αβ	1962 Jun 23.02 14.7 days 1962 Jul 7.7	Cylinder 1500?	8 long? 1.5 dia	1962 Jun 27.5 1962 Jul 3.9	75.09 75.09	89.58 88.82	6631 6553	213 209	293 222	0.006 0.001	140 121

	Name	Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D	[Thor Agena D] 1962αγ	1962 Jun 28.05 76 days 1962 Sep 14	Cylinder 1500?	8 long? 1.5 dia	1962 Jul 3.5 1962 Aug 20.4 1962 Sep 8.4	76.04 76.04 76.01	93.55 91.24 89.48	6828 6713 6619	211 187 176	689 482 305	0.035 0.022 0.010	- 358 297
D	Cosmos 6 (Sputnik 16) 1962α δ1	1962 Jun 30.67 70 days 1962 Sep 8	Ellipsoid 400?	1.8 long 1.2 dia	1962 Jul 1.0 1962 Aug 9.5 1962 Aug 26.1	48.96 48.96 48.95	90.54 89.91 89.46	6683 6652 6628	264 247 241	344 300 258	0.006 0.004 0.001	72 258 358
D	Cosmos 6 rocket 1962α δ2	1962 Jun 30.67 38.5 days 1962 Aug 8.2	Cylinder 1500?	8 long 1.65 dia	1962 Jul 1.0 1962 Jul 21.5 1962 Aug 1.6	48.97 48.97 48.95	90.49 89.86 89.22	6680 6649 6617	262 244 226	342 297 253	0.006 0.004 0.002	72 150 -
	Telstar 1 1962 αε1	1962 Jul 10.36 10000 years	Sphere 77	0.86 dia	1962 Jul 10.4	44.79	157.65	9670	952	5632	0.242	165
	Telstar 1 rocket 1962 αε 2	1962 Jul 10.36 3000 years	Cylinder 24	1.5 long 0.46 dia	1962 Jul 17.5	44.78	157.53	9664	947	5625	0.242	176
D	[Atlas Agena B] 1962αζ1	1962 Jul 18.87 9 days 1962 Jul 27	Cylinder 2000?	8 long? 1.5 dia	1962 Jul 22.2 1962 Jul 24.6	96.12 96.12	88.73 88.50	6588 6577	184 179	236 218	0.004 0.003	217 -
D	Fragment 1962αζ 2											
D	[Thor Agena B] 1962 α η	1962 Jul 21.04 24 days 1962 Aug 14	Cylinder 1500?	8 long? 1.5 dia	1962 Jul 21.2 1962 Aug 4.1 1962 Aug 12.8	70.29 70.29 70.29	90.42 89.69 88.42	6673 6637 6574	208 192 176	381 325 216	0.013 0.010 0.003	155 139 122
D	[Thor Agena B] 1962 α θ	1962 Jul 28.02 27 days 1962 Aug 24	Cylinder 1500?	8 long? 1.5 dia	1962 Jul 28.2 1962 Aug 16.6 1962 Aug 21.7	71.09 71.09 71.09	90.64 89.69 88.93	6684 6637 6599	225 192 188	386 325 254	0.012 0.010 0.005	155 119 109

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	Name	Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D R B	Cosmos 7 1962 α ι 1 (Sputnik 17)	1962 Jul 28.39 4.0 days 1962 Aug 1.4	Sphere-cylinder 4750?	4.3 long 2.4 dia	1962 Jul 30.3	64.95	90.04	6655	197	356	0.012	48
D	Cosmos 7 1962 α ι 2 rocket	1962 Jul 28.39 24 days 1962 Aug 21	Cylinder 1440	3.8 long 2.6 dia	1962 Jul 30.3 1962 Aug 12.1 1962 Aug 18.8	64.96 64.92 64.91	90.00 89.38 88.56	6653 6622 6582	208 198 171	341 291 237	0.010 0.007 0.005	67 58 52
D	Fragments 1962 α ι 3, 4											
D	[Thor Agena D] 1962 α κ 1	1962 Aug 2.02 24 days 1962 Aug 26	Cylinder 1500?	8 long? 1.5 dia	1962 Aug 3.2 1962 Aug 17.7 1962 Aug 24.8	82.25 82.25 82.25	90.77 89.85 88.64	6689 6644 6584	204 199 179	418 332 232	0.016 0.010 0.004	149 99 71
D	Fragment 1962 α κ 2											
D	[Atlas Agena B] 1962 α λ	1962 Aug 5.75 1 day 1962 Aug 6	Cylinder 2000?	8 long? 1.5 dia	1962 Aug 6.0	96.30	88.62	6583	205	205	0	-
D R M	Vostok 3 1962 α μ 1	1962 Aug 11.35 3.94 days 1962 Aug 15.29	Sphere-cylinder 4722	4.3 long 2.4 dia	1962 Aug 11.5 1962 Aug 12.8 1962 Aug 13.8 1962 Aug 15.2	64.98 64.98 64.98 64.98	88.33 88.24 88.13 87.97	6570 6566 6561 6553	166 162 158 155	218 214 207 194	0.004 0.004 0.004 0.003	- - - -
D	Vostok 3 1962 α μ 2 rocket	1962 Aug 11.35 2.7 days 1962 Aug 14.1	Cylinder 1440	3.8 long 2.6 dia	1962 Aug 13.0	64.82	87.50	6529	151	151	0	-
D R M	Vostok 4 1962 α ν 1	1962 Aug 12.33 2.96 days 1962 Aug 15.29	Sphere- cylinder 4728	4.3 long 2.4 dia	1962 Aug 12.4 1962 Aug 13.8 1962 Aug 14.8	64.95 64.95 64.95	88.39 88.26 88.18	6573 6567 6563	169 163 159	222 215 211	0.004 0.004 0.004	- - -
D	Vostok 4 1962 α ν 2 rocket	1962 Aug 12.33 2.4 days 1962 Aug 14.7	Cylinder 1440	3.8 long 2.6 dia	1962 Aug 13.0	64.80	88.38	6573	169	221	0.004	141

	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D	Cosmos 8 (Sputnik 18)	1962 α ξ1	1962 Aug 18.21 364.7 days 1963 Aug 17.9	Ellipsoid 400?	1.8 long 1.2 dia	1962 Aug 18.3 1963 Jan 14.1 1963 Aug 14.9	48.97 48.96 48.93	92.93 91.94 88.26	6799 6751 6571	244 238 173	598 508 213	0.026 0.020 0.003	121 92 45
D	Cosmos 8 rocket	1962 α ξ2	1962 Aug 18.21 123.3 days 1962 Dec 19.5	Cylinder 1500?	8 long 1.65 dia	1962 Aug 19.7 1962 Oct 14.7 1962 Nov 29.0	48.98 48.98 48.96	92.92 91.95 90.50	6799 6752 6681	251 245 232	591 502 373	0.025 0.019 0.011	132 31 246
	[Blue Scout]	1962 α o1	1962 Aug 23.49 80 years	- 20?	1 dia?	1962 Aug 23.5 1965 Sep 15.6	98.66 98.68	99.59 99.57	7117 7115	620 615	858 858	0.017 0.017	240 180
	Altair rocket	1962 α o4	1962 Aug 23.49 60 years	Cylinder 24	1.5 long 0.46 dia	1962 Oct 10.5 1966 Oct 15.5	98.68 98.69	99.57 99.56	7115 7114	615 616	858 855	0.017 0.017	- -
	Fragments	1962 α o 2,3											
D	Sputnik 19	1962 α π1	1962 Aug 25.12 3 days 1962 Aug 28	Cylinder 6500? full	7 long? 2.0 max dia	1962 Aug 25.9 1962 Aug 27.0	64.88 64.88	88.73 88.37	6590 6572	173 168	252 221	0.006 0.004	90 -
D	Sputnik 19 rocket	1962 α π2	1962 Aug 25.12 8 days 1962 Sep 2	Cylinder 2500?	7.5 long 2.6 dia	1962 Aug 25.9 1962 Aug 31.0	64.89 64.89	89.38 88.63	6623 6585	178 161	311 253	0.010 0.007	90 -
D	Fragments	1962 α π 3-8											
D	[Thor Agena D]	1962 α σ	1962 Aug 29.05 12 days 1962 Sep 10	Cylinder 1500?	8 long? 1.5 dia	1962 Aug 30.1 1962 Sep 7.4	65.21 65.21	90.38 89.09	6672 6608	187 170	400 289	0.016 0.009	182 -
D	Sputnik 20	1962 α τ1	1962 Sep 1.1 5 days 1962 Sep 6	Cylinder 6500? full	7 long? 2.0 max dia	1962 Sep 1	64.9	89.4	6623	180?	310?	0.009?	-
D	Fragments *	1962 α τ2-4											

Space Vehicle: Mariner 2, 1962 α ρ1; and rocket 1962 σ ρ2. * Includes Sputnik 20 rocket (1962 α τ_2); life 2 days.

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	Name	Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D	[Thor Agena B] 1962 αυ	1962 Sep 1.86 785.54 days 1964 Oct 26.40	Cylinder 1500?	8 long? 1.5 dia	1962 Sep 9.2 1963 Dec 29.4 1964 Aug 22.5	82.82 82.80 82.79	94.42 92.39 90.65	6863 6764 6684	300 279 266	669 492 346	0.027 0.016 0.006	139 207 35
D	Sputnik 21* 1962 αφ1	1962 Sep 12.07 2 days 1962 Sep 14	Cylinder 6500? full	7 long? 2.0 max dia	1962 Sep 13	64.9	88.48	6578	186	213	0.002	-
D	Fragments** 1962 α φ2-7											
D	[Thor Agena B] 1962 αχ (contained TRS 1)†	1962 Sep 17.99 62.2 days 1962 Nov 19.2	Cylinder 1500?	8 long? 1.5 dia	1962 Sep 19.5 1962 Oct 17.6 1962 Nov 7.6	81.84 81.84 81.84	93.33 91.87 90.09	6814 6743 6655	204 196 191	668 533 363	0.034 0.025 0.013	154 51 -
	Tiros 6 1962 αψ1	1962 Sep 18.37 80 years	Cylinder 127	0.56 long 1.07 dia	1962 Sep 19.4 1965 Jun 21.7	58.32 58.33	98.73 98.70	7078 7076	686 685	713 710	0.002 0.002	102 62
	Tiros 6 rocket 1962 αψ2	1962 Sep 18.37 40 years	Cylinder 24	1.5 long 0.46 dia	1962 Oct 10.6 1965 Jul 15.5	58.29 58.3	98.71 98.64	7076 7073	684 681	712 708	0.002 0.002	- -
	Fragments 1962 αψ 3,4											
D R	Cosmos 9 1962 αω1	1962 Sep 27.40 4.0 days 1962 Oct 1.4	Sphere-cylinder 4750?	4.3 long 2.4 dia	1962 Sep 28	65.0	90.91	6697	292	346	0.004	-
D	Cosmos 9 rocket 1962 αω2	1962 Sep 27.40 86 days 1962 Dec 22	Cylinder 1440	3.8 long 2.6 dia	1962 Oct 5.8	64.94	91.00	6701	304	343	0.003	61
D	Fragments 1962 αω 3-8											

*Sputniks 19, 20 and 21 are believed to have been Venus Probe launchers.

**Includes Sputnik 21 rocket (1962 α ϕ_2); life < 1 day.

†Tetrahedron Research Satellite

	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
	Alouette 1	1962 βα 1	1962 Sep 29.25 2000 years	Oblate spheroid 144.7	0.86 long 1.07 dia	1962 Sep 29.7	80.46	105.52	7332	996	1032	0.002	8
	Alouette 1* rocket (TAVE)	1962 βα 2	1962 Sep 29.25 1500 years	Cylinder 790? (payload 91)	6 long 1.5 dia	1962 Sep 29.7	80.47	105.53	7393	1008	1023	0.001	336
	Fragments	1962βα3,4											
D	[Thor Agena D]	1962 ββ	1962 Sep 29.99 14 days 1962 Oct 14	Cylinder 1500?	8 long? 1.5 dia	1962 Oct 1.5 1962 Oct 10.7	65.40 65.40	90.30 89.08	6668 6607	203 196	376 262	0.013 0.005	172 166
D	Explorer 14	1962 βγ 1	1962 Oct 2.92 3 years?	Octagon + 4 vanes 40	1.30 long 0.74 dia	1962 Oct 10.6 1963 Dec 27.5 1964 Feb 15.5	32.95 42.31 42.77	2185 2184.6 2184.6	55784 55772 55773	281 2558 2601	98530 96229 96189	0.881 0.840 0.839	150 191 -
D	Explorer 14 rocket	1962 βγ 2	1962 Oct 2.92 3 years?	Cylinder 24	1.5 long 0.46 dia	Orbit similar to 1962 βγ 1							
D R M	Mercury 8 (Sigma 7)	1962 βδ 1	1962 Oct 3.51 9.22 hours 1962 Oct 3.89	Cone-frustum 1370	2.90 long 1.83 dia	1962 Oct 3.6	32.55	88.75	6597	153	285	0.010	74
D	Mercury 8 rocket	1962 βδ 2	1962 Oct 3.51 1 day 1962 Oct 4	Cylinder 3400	20 long 3.0 dia	1962 Oct 3.6	32.55	88.67	6594	156	275	0.009	74
D	[Thor Agena B]	1962 βε	1962 Oct 9.79 37.3 days 1962 Nov 16.1	Cylinder 1500?	8 long? 1.5 dia	1962 Oct 10.8 1962 Oct 20.7 1962 Nov 14.6	81.96 81.96 81.96	90.96 90.59 88.37	6658 6680 6569	213 209 170	427 395 212	0.016 0.014 0.003	58 20 286
D R	Cosmos 10	1962 βζ 1	1962 Oct 17.39 4.0 days 1962 Oct 21.4	Sphere-cylinder 4750?	4.3 long 2.4 dia	1962 Oct 17.4	65.00	90.14	6660	197	367	0.013	-
D	Cosmos 10 rocket	1962 βζ 2	1962 Oct 17.39 19 days 1962 Nov 5	Cylinder 1440	3.8 long 2.6 dia	1962 Oct 31.7	64.90	89.06	6606	196	260	0.005	61

Space vehicle: Ranger 5, 1962 βη 1; and rocket 1962 βη 2.

*Carried Thor Agena Vibration Experiment.

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	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D	Cosmos 11	1962 βθ 1	1962 Oct 20.16 575.9 days 1964 May 18.1	Ellipsoid 400?	1.8 long 1.2 dia	1962 Oct 28.2 1963 Dec 30.4 1964 May 3.1	48.97 48.95 48.94	95.95 92.15 89.50	6946 6762 6631	234 234 200	901 533 306	0.048 0.022 0.008	148 249 129
D	Cosmos 11 rocket	1962 βθ 2	1962 Oct 20.16 228.8 days 1963 Jun 6.0	Cylinder 1500?	8 long 1.65 dia	1962 Oct 29.2 1962 Dec 27.6 1963 May 21.3	48.95 48.93 48.93	95.77 94.63 90.49	6937 6883 6679	233 226 221	885 784 381	0.047 0.041 0.012	154 50 351
D	Sputnik 22	1962 βι 1	1962 Oct 24.75? 5 days 1962 Oct 29	Cylinder 6500? full (before explosion)	7 long? 2.0 max dia	1962 Oct 25	64.89	91.18	6711	180?	485?	0.022?	-
D	Fragments	1962 βι 2-24											
D	Star-rad †	1962 βκ	1962 Oct 26.68 1805.00 days 1967 Oct 5.68	Cone-cylinder 1500? (payload 340)	9 long? 1.5 dia	1962 Nov 10.5 1966 Oct 18.7 1967 Oct 2.7	71.39 71.32 71.21	147.43 114.26 90.07	9244 7800 6657	194 197 159	5537 2646 399	0.289 0.157 0.018	147 166 357
	Explorer 15	1962 βλ 1	1962 Oct 27.97 100 years?	Octagon + 4 vanes 45.2	1.30 long 0.74 dia	1962 Oct 28.0 1964 Aug 9.7	18.02 18.02	315.20 311.44	15353 15247	313 300	17640 17438	0.564 0.562	137 196
	Explorer 15 rocket	1962 βλ 2	1962 Oct 27.97 100 years?	Cylinder 24	1.5 long 0.46 dia	Initial orbit similar to 1962 βλ 1							
	Anna 1B*	1962 βμ 1	1962 Oct 31.34 3000 years	Spheroid 161	0.91 long 1.22 dia	1962 Oct 31.8	50.14	107.84	7508	1077	1182	0.007	202
	Anna 1B rocket	1962 βμ 2	1962 Oct 31.34 1500 years	Cylinder 450?	4.8 long 1.4 dia	1962 Nov 7.6 1966 Jun 15.5	50.13 50.13	107.53 107.56	7492 7494	1069 1068	1159 1164	0.006 0.006	- -
	Mars 1	1962 βν 1	1962 Nov 1.68? Indefinite	Cylinder 893.5	3.3 long 1.1 dia	Initial earth-satellite orbit similar to 1962 βν 3							
D	Sputnik 23 rocket	1962 βν 3	1962 Nov 1.68? 0.6 day? 1962 Nov 2.3	Cylinder 2500?	7.5 long 2.6 dia	1962 Nov 1.7	64.9	88.65	6587	174	243	0.005	-
D	Sputnik 23	1962 βν 2	1962 Nov 1.68? 2 days 1962 Nov 3	Irregular	2 long? 2 dia?	Initial orbit similar to 1962 βν 3							

In the United States, Mars 1 has been designated 1962 βν3 and Sputnik 23 rocket 1962 βν1. * Army, Navy, NASA, Air Force. † Starfish radiation.

	Name	Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D	Sputnik 24* 1962 βΞ 1	1962 Nov 4.65 1 day 1962 Nov 5	Cylinder 6500? full	7 long? 2.0 max dia	1962 Nov 4.8	64.8	88.75	6591	200?	226?	0.002?	-
D	Sputnik 24 rocket 1962 βΞ 3	1962 Nov 4.65 76 days 1963 Jan 19	Cylinder 2500?	7.5 long 2.6 dia	1962 Nov 5.4 1962 Dec 1.3	64.7 64.7	92.42 91.49	6772 6726	197 193	590 503	0.029 0.023	353 355
D	Fragments 1962 βΞ 2,4,5											
D	[Thor Agena B] 1962 β o	1962 Nov 5.93 27 days 1962 Dec 3	Cylinder 1500?	8 long? 1.5 dia	1962 Nov 7.7 1962 Nov 29.2	74.98 74.97	90.71 89.02	6687 6603	208 185	409 265	0.015 0.006	150 106
D	[Atlas Agena B] 1962 βπ (contained TRS)	1962 Nov 11.85 1 day 1962 Nov 12	Cylinder 2000?	8 long? 1.5 dia	1962 Nov 12.0	96.00	88.65	6584	206	206	0	-
D	[Thor Agena B] 1962 βρ	1962 Nov 24.92 18 days 1962 Dec 13	Cylinder 1500?	8 long? 1.5 dia	1962 Nov 27.0 1962 Dec 4.3	65.14 65.13	89.92 89.63	6649 6635	204 204	337 310	0.010 0.008	145 150
D	[Thor Agena D] 1962 βσ	1962 Dec 4.90 3 days 1962 Dec 8	Cylinder 1500?	8 long? 1.5 dia	1962 Dec 5.1 1962 Dec 7.0	65.1 65.1	89.16 88.40	6612 6574	194 169	273 222	0.006 0.004	154 223

*Sputniks 22 and 24 are believed to have been Mars probe launchers.

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	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D	[Thor Agena D]	1962 βτ 1	1962 Dec 13.17 1518.97 days 1967 Feb 9.14	Sphere 23	0.6 dia	1962 Dec 17.0 1964 Aug 21.3 1967 Feb 6.5	70.36 70.36 70.25	116.26 109.75 89.37	7887 7593 6621	231 228 177	2786 2202 309	0.162 0.130 0.010	145 157 343
D	Injun 3	1962 βτ 2	1962 Dec 13.17 2082.25 days 1968 Aug 25.42	Sphere 52	0.61 dia	1962 Dec 13.7 1964 Jul 3.2 1968 Jan 3.4	70.38 70.34 70.28	116.32 112.95 99.23	7888 7740 7100	235 236 225	2785 2484 1219	0.162 0.145 0.070	149 233 57
D	[Thor Agena D]	1962 βτ 3	1962 Dec 13.17 200.8 days 1963 Jul 2.0	Sphere 0.2?	0.15 dia	1962 Dec 16.5 1963 Mar 9.7 1963 Apr 21.1	70.33 70.32 70.28	115.89 108.94 101.83	7871 7564 7222	226 225 223	2763 2147 1465	0.161 0.127 0.086	146 53 353
D	Surcal 1A*	1962βτ4	1962 Dec 13.17 1132.66 days 1966 Jan 18.83	Rectangular box 3?	0.2 side	1962 Dec 16.5 1964 Aug 18.8 1965 Sep 20.0	70.34 70.31 70.31	116.24 106.25 96.56	7886 7431 6974	231 227 212	2784 1878 979	0.162 0.111 0.055	146 136 292
D	[Thor Agena D]	1962 βτ 5	1962 Dec 13.17 1515.46 days 1967 Feb 5.63	Sphere 23	0.6 dia	1962 Dec 19.5 1964 Aug 9.5 1967 Jan 29.1	70.34 70.31 70.19	116.22 109.73 90.43	7885 7592 6676	229 226 191	2785 2200 405	0.162 0.130 0.016	143 170 2
D	Injun 3 rocket	1962 βτ 6	1962 Dec 13.17 1928.04 days 1968 Mar 24.21	Cylinder 700?	6 long? 1.5 dia	1962 Dec 28.6 1964 Aug 6.9 1968 Jan 6.3	70.36 70.37 70.19	116.34 112.13 94.78	7889 7704 6888	248 238 214	2774 2412 806	0.160 0.141 0.043	- 189 358
	Relay 1	1962 βυ 1	1962 Dec 13.98 100000 years	Octagonal prism 78	0.81 long 0.74 dia	1962 Dec 14.0	47.49	185.01	10759	1322	7439	0.284	178
	Relay 1 rocket	1962 βυ 2	1962 Dec 13.98 50000 years	Cylinder 24	1.5 long 0.46 dia	1962 Dec 20.0	47.45	184.71	10750	1345	7398	0.282	184

* Surveillance calibration.

	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D	[Thor Agena D]	1962 βφ	1962 Dec 14.89 25.0 days 1963 Jan 8.9	Cylinder 1500?	8 long? 1.5 dia	1962 Dec 15.8 1962 Dec 27.8 1963 Jan 4.5	70.97 70.95 70.95	90.46 89.85 89.08	6674 6643 6604	199 193 178	392 336 274	0.014 0.011 0.007	163 150 122
	Explorer 16	1962 βχ	1962 Dec 16.61 800 years	Cylinder 100.8	1.93 long 0.61 dia	1962 Dec 16.6	52.01	104.32	7344	750	1181	0.029	142
	Transit 5A	1962 βψ 1	1962 Dec 19.06 50 years	Octagon + 4 vanes + boom 61	0.25 long 0.46 dia	1962 Dec 20.0	90.62	99.12	7090	698	725	0.002	353
	Transit 5A rocket	1962 βψ 3	1962 Dec 19.06 60 years	Cylinder 24	1.5 long 0.46 dia	1962 Dec 20.7	90.74	99.11	7089	698	723	0.002	-
2d	Fragments	1962 βψ 2,4,5											
D R	Cosmos 12	1962 βω 1	1962 Dec 22.39 7.9 days 1962 Dec 30.3	Sphere-cylinder 4750?	4.3 long 2.4 dia	1962 Dec 22.4	65.0	90.41	6673	198	392	0.015	-
D	Cosmos 12 rocket	1962 βω 2	1962 Dec 22.39 31 days 1963 Jan 22	Cylinder 1440	3.8 long 2.6 dia	1963 Jan 2.6	64.94	90.17	6662	197	370	0.013	-

	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D	Sputnik 25* rocket	1963-01A	1963 Jan 4.3 1 day 1963 Jan 5	Cylinder 2500?	7.5 long 2.6 dia	1963 Jan 4	64.9	87.5	6529	151?	151?	0	-
D	Fragments	1963-01B,C											
D	[Thor Agena D]	1963-02A	1963 Jan 7.88 16.3 days 1963 Jan 24.2	Cylinder 1500?	8 long? 1.5 dia	1963 Jan 7.9 1963 Jan 13.8 1963 Jan 21.4	82.23 82.23 82.19	90.54 90.01 88.75	6680 6651 6589	205 193 168	399 353 254	0.015 0.012 0.006	178 156 126
D	Fragment	1963-02B											
D	[Thor Agena D]	1963-03A	1963 Jan 16.92 2184.58 days 1969 Jan 9.50	Cylinder 1500?	8 long? 1.5 dia	1963 Jan 16.9 1968 Jan 2.2 1968 Jun 30.5	81.89 81.90 81.87	94.66 93.36 92.53	6874 6817 6775	459 418 384	533 459 410	0.005 0.003 0.002	40 216 -
D	Fragments	1963-03B,C											
	Syncom 1**	1963-04A	1963 Feb 14.22 > million years	Cylinder 39	0.39 long 0.71 dia	1963 Feb 14.2	33.30	1425.5	41944	34392	36739	0.028	276
	Syncom 1 rocket	1963-04B	1963 Feb 14.22 20 years	Cylinder 24	1.5 long 0.46 dia	1963 Apr 4.9 1969 Sep 16.0 1976 Jul 1.0	33.12 32.70 32.7	606.0 456.8 323.6	23753 19647 15615	252 276 233	34498 26262 18240	0.721 0.661 0.577	165 - -
	Altair rocket	1963-05B	1963 Feb 19.69 16 years	Cylinder 24	1.5 long 0.46 dia	1963 Mar 9.7 1970 Jul 1.0	100.48 100.48	97.79 96.68	7026 6973	505 483	791 707	0.020 0.016	289 -
	[Blue Scout]	1963-05A	1963 Feb 19.69 30 years	- 40?	1 dia?	1963 Feb 19.7 1966 Oct 15.8	100.49 100.47	97.81 97.70	7028 7026	510 500	789 795	0.020 0.021	340 343
1d	Fragments	1963-05C,D											
D R	Cosmos 13	1963-06A	1963 Mar 21.35 8.0 days 1963 Mar 29.3	Sphere-cylinder 4750?	4.3 long 2.4 dia	1963 Mar 21.4	64.97	89.65	6636	192	324	0.010	65?
D	Cosmos 13 rocket	1963-06B	1963 Mar 21.35 19 days 1963 Apr 9	Cylinder 1440	3.8 long 2.6 dia	Initial orbit similar to 1963-06A							

*Sputnik 25 is believed to have been a Luna launcher; 1963-01B is believed to have been a payload. (Decayed 1963 Jan 11.)

** Synchronous communication.

Year of launch 1963, continued

	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D	[Thor Agena D]	1963-07A	1963 Apr 1.32 25.0 days 1963 Apr 26.9	Cylinder 1500?	8 long? 1.5 dia	1963 Apr 2.0 1963 Apr 10.4	75.40 75.38	90.66 90.28	6683 6661	201 198	408 367	0.015 0.013	158 134
	Luna 4*	1963-08A	1963 Apr 2.35? Indefinite?	Cylinder 1422	2.5 long? 1.0 dia?	Initial earth-satellite orbit similar to 1963-08C 1963 Apr	-	42000	398000	89250	6944000	0.760	-
D	Luna 4 launcher rocket	1963-08C	1963 Apr 2.35? 1 day 1963 Apr 3	Cylinder 2500?	7.5 long 2.6 dia	1963 Apr 2.4	65	88	6554?	176?	176?	0?	-
D	Explorer 17	1963-09A	1963 Apr 3.08 1331.27 days 1966 Nov 24.35	Sphere 185	0.89 dia	1963 Apr 3.1 1965 Sep 15.3 1966 Oct 20.1	57.63 57.59 57.60	96.40 93.62 90.31	6964 6832 6670	255 242 218	917 666 365	0.048 0.031 0.011	49 76 68
D	Explorer 17 rocket	1963-09B	1963 Apr 3.08 235.6 days 1963 Nov 24.7	Cylinder 24	1.5 long 0.46 dia	1963 Apr 3.6 1963 May 31.6	57.59 57.59	96.32 95.12	6962 6904	247 245	920 807	0.048 0.041	51 -
D	Cosmos 14	1963-10A	1963 Apr 13.46 137.6 days 1963 Aug 29.1	Ellipsoid 400?	1.8 long 1.2 dia	1963 Apr 13.5 1963 Jun 2.4	48.95 48.88	91.99 91.29	6754 6722	252 253	499 435	0.018 0.013	- -
D	Cosmos 14 rocket	1963-10B	1963 Apr 13.46 84.2 days 1963 Jul 6.7	Cylinder 1500?	8 long 1.65 dia	1963 May 1.0 1963 Jun 9.0	48.90 48.90	91.59 90.64	6735 6689	249 237	465 384	0.016 0.011	205 42
D R	Cosmos 15	1963-11A	1963 Apr 22.35 5.0 days 1963 Apr 27.3	Sphere-cylinder 4750?	4.3 long 2.4 dia	1963 Apr 22.4	65.00	89.67	6637	160	358	0.015	-
D	Cosmos 15 rocket	1963-11B	1963 Apr 22.35 9.5 days 1963 May 1.8	Cylinder 1440	3.8 long 2.6 dia	1963 Apr 27.3	64.95	89.21	6614	170	302	0.010	58

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* In the UB, Luna 4 has been designated as 1963-08B and the rocket as 1963-08A. There may be a rocket in the Luna 4 orbit.

	Name	Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D R	Cosmos 16 1963-12A	1963 Apr 28.40 9.9 days 1963 May 8.3	Sphere-cylinder 4750?	4.3 long 2.4 dia	1963 Apr 28.4	65.02	90.38	6669	194	388	0.015	57
D	Cosmos 16 rocket 1963-12B	1963 Apr 28.40 22.3 days 1963 May 20.7	Cylinder 1440	3.8 long 2.6 dia	1963 Apr 30.3	65.02	90.48	6674	196	396	0.015	73
	Telstar 2 1963-13A	1963 May 7.48 200000 years	Spheroid 79.4	0.94 long 0.86 dia	1963 May 7.5	42.73	225.05	12267	974	10803	0.401	172
	Telstar 2 rocket 1963-13B	1963 May 7.48 100000 years	Cylinder 24	1.52 long 0.45 dia	1963 May 13.3	42.76	224.81	12258	989	10770	0.399	178
	Midas 1963-14A [Atlas Agena B]	1963 May 9.84 100000 years	Cylinder 2000?	9 long? 1.5 dia	1963 May 12.2	87.42	166.48	10020	3604	3680	0.004	69
	DASH 1* 1963-14B	1963 May 9.84 50 years	Inflated sphere 0.05?	0.31 dia	1963 May 15.2 1968 Jan 8.6	87.35 87.19	166.51 166.24	10022 10015	3604 2725	3683 4548	0.004 0.091	69 280
	TRS 2 1963-14C	1963 May 9.84 50000 years	Tetrahedron 0.7	0.17 side	1963 May 29.2	87.42	166.47	10020	3606	3678	0.004	54
	TRS 3 1963-14D	1963 May 9.84 50000 years	Tetrahedron 0.7	0.17 side	1963 May 29.2	87.41	166.47	10020	3612	3672	0.003	54
D	Westford Needles 1963-14	1963 May 9.84 2 to 4 years	Annulus 23	20000 km dia	1963 Aug 7 1964 Jan 29	87.35 87.22	166.46 166.0	10019 10007	3367 2760	3915 4497	0.027 0.087	180 349
29d	Fragments 1963-14E-DE											

* Density and scale height.

	Name	Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D R M	Mercury 9* 1963-15A (Faith 7)	1963 May 15.54 1.44 days 1963 May 16.98	Cone frustum 1370	2.90 long 1.83 dia	1963 May 15.6	32.54	88.64	6592	161	267	0.008	-
D	Mercury 9 1963-15B rocket	1963 May 15.54 0.6 day 1963 May 16.2	Cylinder 3400	20 long 3.0 dia	1963 May 15.7	32.54	88.22	6571	167	219	0.004	72
D	[Thor Agena D] 1963-16A	1963 May 18.94 8 days 1963 May 27	Cylinder 1500?	8 long? 1.5 dia	1963 May 20.4	74.54	91.12	6703	153	497	0.025	142
D	**Cosmos 17 1963-17A**	**1963 May 22.13** **742.79 days** **1965 Jun 2.92**	**Ellipsoid** **400?**	**1.8 long** **1.2 dia**	**1963 May 22.2** **1964 Jan 1.9** **1965 May 28.7**	**49.0** **49.0** **48.93**	**94.99** **93.69** **88.58**	**6902** **6839** **6586**	**260** **256** **185**	**788** **666** **230**	**0.037** **0.030** **0.004**	**107** **354** **270**
D	Cosmos 17 1963-17C rocket	1963 May 22.13 316.7 days 1964 Apr 2.8	Cylinder 1500?	8 long 1.65 dia	1963 May 30.6 1964 Jan 7.4 1964 Feb 15.5	49.0 49.0 49.01	94.74 91.80 91.22	6891 6745 6716	265 238 246	761 495 430	0.036 0.019 0.014	139 66 -
D	Fragments 1963-17B-F											
D R	Cosmos 18 1963-18A	1963 May 24.45 9.0 days 1963 Jun 2.4	Sphere-cylinder 4750?	4.3 long 2.4 dia	1963 May 24.5	65.0	89.30	6620	196	288	0.007	-
D	Cosmos 18 1963-18B rocket	1963 May 24.45 14.6 days 1963 Jun 8.0	Cylinder 1440	3.8 long 2.6 dia	1963 May 26.9 1963 Jun 3.4	65.0 64.95	89.47 88.74	6629 6593	198 195	304 235	0.008 0.003	96 92
D	[Thor Agena D] 1963-19A	1963 Jun 13.00 29.1 days 1963 Jul 12.1	Cylinder 1500?	8 long? 1.5 dia	1963 Jun 14.4 1963 Jul 10.0	81.87 81.82	90.67 88.48	6684 6577	192 173	419 225	0.017 0.004	135 36

* Mercury 9 ejected a 0.15m flashing-light capsule about 1963 May 15.72.

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	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D	Vostok 5	1963-20A	1963 Jun 14.50	Sphere-cylinder	4.3 long	1963 Jun 14.8	64.97	88.27	6564	162	209	0.004	-
R			4.96 days	4720	2.4 dia	1963 Jun 15.5	64.97	88.23	6561	160	206	0.004	-
M			1963 Jun 19.46			1963 Jun 17.5	64.97	88.00	6549	152	189	0.003	-
D	Vostok 5 rocket	1963-20B	1963 Jun 14.50	Cylinder	3.8 long	1963 Jun 15.9	64.86	87.88	6547	150	187	0.003	110
			2.0 days	1440	2.6 dia								
			1963 Jun 16.5										
D	[Thor Agena D]	1963-21A	1963 Jun 15.61	Cylinder	8 long?	1963 Jun 16.1	69.87	95.65	6924	172	919	0.054	152
			53.4 days	1300?	1.5 dia	1963 Jul 13.2	69.87	93.34	6811	160	706	0.040	109
			1963 Aug 8.0										
D	Lofti 2A	1963-21B	1963 Jun 15.61	Sphere	0.61 dia	1963 Jun 15.6	69.87	95.71	6926	171	925	0.054	152
			32.8 days	26		1963 Jul 11.0	69.84	91.24	6709	161	501	0.026	110
			1963 Jul 18.4										
D	SR 6A	1963-21C	1963 Jun 15.61	Sphere	0.61 dia	1963 Jul 18.3	69.88	92.08	6751	155	590	0.032	100
			46.7 days	39		1963 Jul 31.3	69.85	88.84	6590	146	278	0.010	74
			1963 Aug 1.3										
D	Radose •	1963-21D	1963 Jun 15.61	Sphere	0.51 dia	1963 Jun 28.9	69.88	94.84	6884	175	837	0.048	139
			44.9 days	25?		1963 Jul 26.7	69.82	89.91	6644	152	379	0.017	85
			1963 Jul 30.5										
D	[Thor Agena D]	1963-21E	1963 Jun 15.61	Sphere	0.61 dia	1963 Jun 26.4	69.91	94.82	6883	181	829	0.048	139
			42.1 days	35?		1963 Jul 26.5	69.87	88.74	6585	154	260	0.008	87
			1963 Jul 27.7										
D	Surcal 1B	1963-21F	1963 Jun 15.61	rectangular box	0.2 side	1963 Jun 17.4	69.86	95.26	6906	169	887	0.052	150
			19.7 days	3?		1963 Jul 2.5	69.81	90.67	6680	168	435	0.020	123
			1963 Jul 5.3										
D	Fragment	1963-21G											
	Transit 7 [Blue Scout]	1963-22A	1963 Jun 16.08	octagon + 4 vanes + boom 55	0.25 long 0.46 dia	1963 Jun 16.5	89.97	99.67	7119	724	757	0.002	64
			50 years										
	Altair rocket	1963-22B	1963 Jun 16.08	Cylinder	1.5 long	1963 Jun 16.2	90.02	99.67	7119	720	759	0.002	-
			100 years	24	0.46 dia								
1d	Fragments	1963-22C,D											

• Radiation dosimeter

	Name	Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D	Vostok 6 1963-23A	1963 Jun 16.40	Sphere-cylinder	4.3 long	1963 Jun 16.4	65.09	88.34	6571	168	218	0.004	80
R		2.95 days	4713	2.4 dia	1963 Jun 17.5	65.09	88.25	6566	164	212	0.004	-
M		1963 Jun 19.35										
D	Vostok 6 rocket 1963-23B	1963 Jun 16.40	Cylinder	3.8 long	1963 Jun 16.8	65.08	88.38	6571	163	223	0.005	76
		1.7 days?	1440	2.6 dia								
		1963 Jun 18.1?										
	Tiros 7 1963-24A	1963 Jun 19.41	Cylinder	0.56 long	1963 Jun 19.5	58.23	97.40	7013	621	649	0.002	17
		50 years	135	1.07 dia	1968 Jan 18.7	58.23	97.34	7010	616	648	0.002	141
	Tiros 7 rocket 1963-24B	1963 Jun 19.41	Cylinder	1.5 long	1963 Jul 23.1	58.21	97.32	7009	612	650	0.003	56
		17 years	24	0.46 dia	1970 Jun 1.0	58.22	96.27	6959	577	585	0.001	-
	Fragments 1963-24C,D											
D	[Thor Agena D] 1963-25A	1963 Jun 27.03	Cylinder	8 long?	1963 Jun 29.5	81.6	90.5	6674	196	396	0.015	147
		29.7 days	1000?	1.5 dia	1963 Jul 23.8	81.6	88.8	6583	168	243	0.006	36
		1963 Jul 26.7										
	Hitch-hiker 1 1963-25B	1963 Jun 27.03	Octagon	0.3 long	1963 Jul 20.1	82.11	132.55	8607	333	4132	0.221	350
		40 years	79.8	0.9 dia	1966 Oct 27.9	82.11	131.81	8580	340	4046	0.217	54
			23 payload		1968 Jan 17.9	82.13	131.14	8551	343	4002	0.214	343
	GRS* 1963-26A	1963 Jun 28.83	Cylinder	2.54 long	1963 Jun 29.6	49.74	102.05	7239	411	1311	0.062	136
		30 years	99.3	0.59 dia	1971 Feb 15.0	49.74	100.33	7156	409	1147	0.052	-
D	[Thor Agena B] 1963-27A	1963 Jun 29.94	Cylinder	8 long?	1963 Jul 10.0	82.3	94.84	6888	484	536	0.004	336
		2310.72 days	1500?	1.5 dia	1968 Jan 13.3	82.33	93.92	6844	452	479	0.002	337
		1969 Oct 26.66			1968 Nov 30.5	82.33	93.11	6805	417	436	0.001	-
D	Fragments 1963-27B,C											

* Geophysics Research Satellite.

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	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D	[Atlas Agena D]	1963-28A	1963 Jul 12.86 5.2 days 1963 Jul 18.0	Cylinder 2000?	8 long? 1.5 dia	1963 Jul 17.1	95.37	88.2	6542	164	164	0	136
D	Fragments	1963-28B,C											
D	[Thor Agena D]	1963-29A	1963 Jul 19.00 25.8 days 1963 Aug 13.8	Cylinder 1500?	8 long? 1.5 dia	1963 Jul 20.7 1963 Jul 26.8 1963 Aug 11.6	82.86 82.86 82.86	90.44 90.37 88.65	6669 6656 6573	194 189 178	387 367 215	0.014 0.013 0.003	142 118 43
D	Fragment	1963-29B											
	Midas 7* [Atlas Agena B]	1963-30A	1963 Jul 19.16 100000 years	Cylinder 2000?	9 long? 1.5 dia	1963 Jul 23.5	88.41	167.80	10077	3670	3727	0.003	16
	TRS 4	1963-30B	1963 Jul 19.16 5000 years	Tetrahedron 0.8	0.17 side	1963 Jul 20.9 1966 Aug 24.3	88.36 88.44	167.79 167.90	10076 10081	3662 3662	3734 3743	0.003 0.004	- 334
D	DASH 2	1963-30D	1963 Jul 19.16 2824.22 days 1971 Apr 12.38	Inflated sphere 1.25?	2.4 dia?	1963 Aug 6.1 1965 Sep 22.2 1970 Aug 1.0	88.42 87.96 85.24	167.96 167.61 164.2	10083 10070 9936	3665 2906 841	3745 4477 6274	0.004 0.078 0.273	45 300 -
	Fragments	1963-30C,E-G											
	Syncom 2	1963-31A	1963 Jul 26.61 > million yr	Cylinder 39	0.39 long 0.71 dia	1963 Jul 27.8 1964 Oct 9.6	33.05 32.36	1454.0 1437.9	42512 42201	35584 35780	36693 35865	0.013 0.001	62 221
	Syncom 2 rocket	1963-31B	1963 Jul 26.61 16 years	Cylinder 24	1.5 long 0.46 dia	1963 Aug 15.0 1968 Jan 15.5 1970 Nov 1.0	33.14 32.87 32.7	636.5 393.8 248.4	24505 17796 13089	255 190 216	36029 22647 13205	0.730 0.631 0.496	- - -
D r?	[Thor Agena D]	1963-32A	1963 Jul 31.00 12.0 days 1963 Aug 12.0	Cylinder 1500?	8 long? 1.5 dia	1963 Aug 5.7	74.95	90.4	6663	157	411	0.019	110
D	Fragment	1963-32B											

*Contains a TRS.

	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D	Cosmos 19	1963-33A	1963 Aug 6.25 237.07 days 1964 Mar 30.32	Ellipsoid 400?	1.8 long 1.2 dia	1963 Aug 15.6 1963 Oct 10.7 1964 Jan 7.0	49.01 49.01 49.00	92.11 91.71 90.89	6760 6740 6704	267 261 252	497 463 400	0.017 0.015 0.011	153 99 98
D	Cosmos 19 rocket	1963-33B	1963 Aug 6.25 124.8 days 1963 Dec 9.0	Cylinder 1500?	8 long 1.65 dia	1963 Aug 15.5 1963 Oct 21.1 1963 Dec 3.7	49.00 49.00 48.94	92.00 91.07 89.58	6756 6712 6626	267 253 235	489 415 261	0.016 0.012 0.002	- 109 295
D	[Thor Agena D]	1963-34A	1963 Aug 25.02 18.6 days 1963 Sep 12.6	Cylinder 1500?	8 long? 1.5 dia	1963 Sep 7.3	75.01	89.4	6618	161	320	0.012	104
D	Fragment	1963-34B											
D	Lampo	1963-35A	1963 Aug 29.80 69.7 days 1963 Nov 7.5	Cylinder 1000?	8 long? 1.5 dia	1963 Sep 3.0 1963 Oct 22.1	81.89 81.86	90.80 90.00	6686 6652	292 261	324 287	0.002 0.002	151 32
D	[Thor Agena D]	1963-35B	1963 Aug 29.80 29-30 days 1963 Sep 28-29	-	-	1963 Sep 2.7	81.89	92.07	6749	310	431	0.009	261
D	Fragments	1963-35C,D											
D	[Atlas Agena D]	1963-36A	1963 Sep 6.81 7.05 days 1963 Sep 13.86	Cylinder 2000?	8 long? 1.5 dia	1963 Sep 10.8	94.37	89.06	6594	168	263	0.007	103
D	Fragments	1963-36B-F											
D	[Thor Agena D]	1963-37A	1963 Sep 23.95 18.2 days 1963 Oct 12.1	Cylinder 1500?	8 long? 1.5 dia	1963 Sep 24.1 1963 Oct 10.8	74.90 74.89	90.63 88.64	6679 6594	161 150	441 282	0.021 0.010	158 101

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	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
	Ablestar rocket	1963-38A	1963 Sep 28.84 500 years	Cylinder 450?	4.8 long 1.4 dia	1963 Sep 29.7	89.80	107.13	7466	1069	1107	0.003	240
	Transit 5B-1	1963-38B	1963 Sep 28.84 1000 years	Octagon + boom 70	0.5 long 0.46 dia	1963 Oct 11.1	89.90	107.42	7479	1075	1127	0.003	232
	Radiation satellite (SN-39)	1963-38C	1963 Sep 28.84 1000 years	Octagon + 4 vanes 61	0.3 long? 0.46 dia?	1963 Oct 11.2	89.89	107.40	7479	1075	1126	0.003	234
	Fragments	1963-38D-H											
	Vela 1 [Atlas Agena D]	1963-39A	1963 Oct 17.10 >million years	Icosahedron 150	1.4 dia	1963 Oct 17.1 1968 Jan 15.5	38.3 37.1	6270 6474	113000 115128	102098 93470	111137 124031	0.040 0.133	- -
D	TRS 5	1963-39B	1963 Oct 17.10 1 year?	Tetrahedron 2.0	0.23 side	1963 Oct 17.1 1964 Apr 1.5	36.77 35.90	2329 2319.4	58240 58041	220 953	103500 102372	0.887 0.874	153 -
	Vela 2	1963-39C	1963 Oct 17.10 > million years	Icosahedron 150	1.4 dia	1963 Oct 19 1968 Jan 15.5	37.8 36.2	6370 6507	113900 115500	99300 100122	115800 118122	0.072 0.078	- -
D	Agena D rocket	1963-39D	1963 Oct 17.10 1 year?	Cylinder 700?	6 long? 1.5 dia	Orbit similar to 1963-39B							
D R	Cosmos 20	1963-40A	1963 Oct 18.40 7.9 days 1963 Oct 26.3	Sphere-cylinder 4750?	4.3 long 2.4 dia	1963 Oct 18.7 1963 Oct 20.7	64.90 64.90	89.60 89.51	6632 6628	205 204	302 296	0.007 0.007	32 32
D	Cosmos 20 rocket	1963-40B	1963 Oct 18.40 12 days 1963 Oct 30-31	Cylinder 1440	3.8 long 2.6 dia	1963 Oct 18.4 1963 Oct 28.0	64.91 64.87	89.68 88.12	6635 6586	204 185	310 231	0.008 0.004	43 91

	Name	Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D	[Atlas Agena D] 1963-41A	1963 Oct 25.79 4.0 days 1963 Oct 29.8	Cylinder 1500?	8 long? 1.5 dia	1963 Oct 26.0 1963 Oct 27.8	99.05 99.05	88.99 88.70	6616 6584	144 140	332 272	0.014 0.010	97 78
D	Capsule 1963-41B	1963 Oct 25.79 3.2 days 1963 Oct 29.0	-	-	1963 Oct 27.9	99.05	88.85	6595	136	297	0.012	78
D	Fragments 1963-41C,D											
D	[Thor Agena D] 1963-42A	1963 Oct 29.88 83.51 days 1964 Jan 21.39	Cylinder 1000?	8 long? 1.5 dia	1963 Nov 2.1 1963 Nov 29.4 1964 Jan 6.4	89.90 89.90 89.89	90.84 90.42 89.53	6690 6670 6623	279 275 232	345 308 258	0.005 0.002 0.002	- 250 84
D	[Thor Agena D] 1963-42B	1963 Oct 29.88 571.12 days 1965 May 23.00	Octagon? 60?	0.3 long? 0.9 dia?	1963 Oct 31.7 1964 Nov 18.5 1965 May 18.4	89.99 89.97 89.95	93.35 91.83 88.90	6813 6741 6596	285 282 205	585 444 231	0.022 0.012 0.002	32 284 223
D	Fragment 1963-42C											
	Polyot 1 1963-43A	1963 Nov 1.37 25 years	Irregular 600?	2 long? 1 dia?	1963 Nov 1.4 1963 Nov 2.0 1968 Jan 9.5 1971 Dec 1.0	- † 58.92 58.90 58.8	94.0 102.46 101.55 99.71	6843 7268 7211 7130	339 343 342 329	592 1437 1323 1175	0.018 0.075 0.068 0.059	- 114 320 -
D	Fragments 1963-43B-D											
D	Cosmos 21* 1963-44A	1963 Nov 11.27 2.86 days 1963 Nov 14.13	Cylinder 6520? full	7 long? 2.0 max dia	1963 Nov 11.4	64.83	88.5	6577	182	216	0.003	-
D	Cosmos 21 rocket 1963-44B	1963 Nov 11.27 1.69 days 1963 Nov 12.96	Cylinder 2500?	7.5 long 2.6 dia	Orbit similar to 1963-44A							

* Cosmos 21 may have been a Space Vehicle launcher. † Initial inclination not announced.

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	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D R	Cosmos 22	1963-45A	1963 Nov 16.45 6.0 days 1963 Nov 22.4	Sphere-cylinder 5530?	5 long? 2.4 dia	1963 Nov 16.5	64.93	90.29	6665	192	381	0.014	-
D	Cosmos 22 rocket	1963-45B	1963 Nov 16.45 16.7 days 1963 Dec 3.2	Cylinder 2500?	7.5 long 2.6 dia	1963 Nov 18.4 1963 Dec 1.1	64.86 64.84	90.14 88.06	6658 6573	189 166	369 223	0.013 0.004	33 40
D	Explorer 18 (Imp 1)*	1963-46A	1963 Nov 27.10 25 months 1965 Dec	Octagon + 4 vanes 62	0.34 long 0.74 dia	1963 Nov 28.5 1964 Sep 15.5 1965 Sep 8.8	33.34 35.29 35.20	5666 5599 5606	105,282 103,453 104,592	192 2073 4395	197,616 192,077 192,033	0.938 0.918 0.897	- - 162
D	Explorer 18 rocket	1963-46B	1963 Nov 27.10 2 years?	Cylinder 24	1.5 long 0.46 dia	Orbit similar to 1963-46A							
	Centaur AC2	1963-47A	1963 Nov 27.79 100 years	Cylinder 4620	8.6 long 3.0 dia	1963 Nov 30.8	30.34	107.46	7500	544	1699	0.077	137
1d	Fragments	1963-47B-P											
D	[Thor Agena D]	1963-48A	1963 Nov 27.88 17.3 days 1963 Dec 15.2	Cylinder 1500?	8 long? 1.5 dia	1963 Nov 30	69.99	90.2	6658	175	386	0.016	-

* Interplanetary monitoring platform.

	Name	Launch date, lifetime and descent data	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
	Ablestar rocket 1963-49A	1963 Dec 5.91 500 years	Cylinder 450?	4.8 long 1.4 dia	1963 Dec 6.1	89.97	106.86	7458	1065	1095	0.002	308
	Transit 5B-2 1963-49B	1963 Dec 5.91 1000 years	Octagon + boom 75	0.5 long 0.46 dia	1963 Dec 12.4	89.98	107.18	7468	1067	1112	0.003	327
	[Thor Ablestar] 1963-49C	1963 Dec 5.91 1000 years	Octagon + 4 vanes 53	0.25 long 0.46 dia	1963 Dec 8.8	89.95	107.16	7468	1069	1111	0.003	303
	Fragments 1963-49D-H											
D	Cosmos 23 1963-50A	1963 Dec 13.58 104.48 days 1964 Mar 27.06	Ellipsoid + 2 panels 400?	1.8 long? 1.2 dia?	1963 Dec 13.7 1964 Jan 9.3	49.0 48.98	92.30 92.27	6805 6769	240 241	613 540	0.027 0.022	126 255
D	Cosmos 23 rocket 1963-50B	1963 Dec 13.58 84.37 days 1964 Mar 6.95	Cylinder 1500?	8 long 1.65 dia	1963 Dec 13.6 1964 Jan 12.0	49.12 48.99	92.84 92.04	6799 6757	230 230	611 527	0.028 0.022	136 268
D	Fragments 1963-50C, D											
D	[Atlas Agena D] 1963-51A	1963 Dec 18.91 1.28 days 1963 Dec 20.17	Cylinder 2000?	8 long? 1.5 dia	1963 Dec 19.1	97.89	88.48	6572	122	266	0.011	94
D R	Cosmos 24 1963-52A	1963 Dec 19.39 8.9 days 1963 Dec 28.3	Sphere-cylinder 4750?	4.3 long 2.4 dia	1963 Dec 19.8	65.03	90.51	6676	204	391	0.014	49
D	Cosmos 24 rocket 1963-52B	1963 Dec 19.39 37.1 days 1964 Jan 25.5	Cylinder 1440	3.8 long 2.6 dia	1963 Dec 21.1 1964 Jan 13.0	65.00 65.00	90.58 89.61	6679 6630	207 192	394 312	0.014 0.009	62 46

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	Name	Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
	Explorer 19 1963-53A	1963 Dec 19.78 20 years	Inflated sphere 7	3.65 dia	1963 Dec 19.8 1968 Jan 9.4 1972 Feb 1.0	78.62 78.76 78.90	115.93 113.48 112.02	7870 7764 7699	590 749 871	2394 2022 1770	0.115 0.082 0.058	- 98 -
	Explorer 19 1963-53B rocket	1963 Dec 19.78 200 years	Cylinder 24	1.3 long 0.46 dia	1963 Dec 23.0	78.62	115.85	7867	594	2383	0.114	154
1d	Fragments 1963-53C-J											
	Tiros 8 1963-54A	1963 Dec 21.39 80 years	Cylinder 119	0.55 long 1.05 dia	1963 Dec 21.5	58.48	99.33	7105	691	765	0.005	123
	Tiros 8 1963-54B rocket	1963 Dec 21.39 40 years	Cylinder 24	1.5 long 0.46 dia	1963 Dec 29.9 1969 Sep 16.0	58.47 58.47	99.27 99.05	7103 7092	696 690	753 737	0.004 0.003	117 -
	Fragments 1963-54C,D											
D	[Thor Agena D] 1963-55A	1963 Dec 21.91 18.0 days 1964 Jan 8.9	Cylinder 1000?	8 long? 1.5 dia	1963 Dec 22.3	64.94	89.96	6644	176	355	0.0135	149
D	[Thor Agena D] 1963-55B	1963 Dec 21.91 326.89 days 1964 Nov 7.80	Octagon? 60?	0.3 long? 0.9 dia?	1963 Dec 23.8 1964 Jul 26.1 1964 Nov 4.1	64.52 64.52 64.52	91.68 90.73 88.72	6733 6689 6588	321 291 203	388 331 216	0.005 0.003 0.001	89 348 307

Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
Agena D rocket	1964-01A	1964 Jan 11.84 800 years	Cylinder 700?	6 long 1.5 dia	1964 Jan 16.3	69.91	103.47	7298	905	934	0.002	84
OGSE 1*	1964-01B	1964 Jan 11.84 1000 years	Sphere 39	0.51 dia	1964 Jan 16.8	69.94	103.47	7298	898	942	0.003	92
Secor 1** (EGRS 1)†	1964-01C	1964 Jan 11.84 1500 years	Rectangular box 18	0.36 x 0.28 x 0.23	1964 Jan 16.8	69.89	103.46	7297	904	933	0.002	84
SR 7A (Greb 7A)	1964-01D	1964 Jan 11.84 1000 years	Sphere 45	0.6 dia	1964 Jan 16.8	69.90	103.47	7298	905	934	0.002	74
[Thor Agena D]	1964-01E	1964 Jan 11.84 1000 years	-	0.7 dia?	1964 Jan 21.3	69.90	103.48	7298	905	934	0.002	96
Agena D rocket	1964-02A	1964 Jan 19.45 300 years	Cylinder 700?	8 long? 1.5 dia	1964 Nov 9.5	99.07	101.33	7199	792	850	0.004	169
Capsule	1964-02B	1964 Jan 19.45 300 years	Polyhedral cylinder?	0.5 long? 1.0 dia?	1964 Jan 22.5	99.04	101.31	7194	801	830	0.002	354
[Thor Agena D]	1964-02C	1964 Jan 19.45 300 years	Polyhedral cylinder?	0.5 long? 1.0 dia?	1964 Jan 22.5	99.07	101.32	7196	811	825	0.001	349
Relay 2	1964-03A	1964 Jan 21.88 1 million years	Octagonal prism 78	0.81 long 0.74 dia	1964 Jan 22.9	46.32	194.60	11129	2091	7411	0.239	184
Relay 2 rocket	1964-03B	1964 Jan 21.88 250000 years	Cylinder 24	1.5 long 0.46 dia	1964 Jan 22.8	46.32	194.61	11132	2071	7437	0.241	186

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* Gravity Gradient Stabilisation Experiment. ** Sequential collation of range. † Electronic Geodetic Ranging System.

	Name	Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D	Echo 2 1964-04A	1964 Jan 25.58 1960.17 days 1969 Jun 7.75	Sphere 256	41 dia	1964 Jan 27.1 1966 Sep 20.2 1968 Jan 15.7	81.50 81.46 81.47	108.95 107.64 105.55	7551 7496 7399	1029 966 932	1316 1268 1110	0.019 0.020 0.012	104 160 348
	Echo 2 rocket 1964-04B	1964 Jan 25.58 5000 years	Cylinder 700?	6 long 1.5 dia	1964 Jan 27.1	81.50	108.96	7552	1030	1317	0.019	103
1d	Fragments 1964-04C-E											
D	Saturn SA5 1964-05A	1964 Jan 29.68 821.40 days 1966 Apr 30.08	Cone-cylinder 17100	25.6 long 5.5 dia	1964 Jan 30.6 1965 Oct 12.1 1966 Apr 16.8	31.43 31.45 31.43	94.60 91.88 89.30	6890 6751 6623	264 244 212	760 501 278	0.036 0.019 0.005	135 112 8
	Elektron 1 1964-06A	1964 Jan 30.40 200 years	Cylinder and 6 paddles 329	1.2 long 0.8 dia	1964 Jan 31.5	60.83	169.32	10138	394	7126	0.332	61
	Elektron 2 1964-06B	1964 Jan 30.40 30 years	Cone-cylinder 444	2.4 long 1.8 dia	1964 Feb 5.0 1971 Mar 1.0	60.87 58.62	1356.40 1356.24	40593 40588	441 4735	67988 63684	0.832 0.726	70 -
	Elektron 2 rocket 1964-06D	1964 Jan 30.40 30 years	Cylinder 1440	3.8 long 2.6 dia	1964 Feb 5.1 1971 Mar 1.0	60.87 58.58	1384.11 1383.87	41146 41139	411 4974	69123 64548	0.835 0.724	70 -
	Fragment 1964-06C											

Space Vehicle: Ranger 6, 1964-07A

	Name	Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D	[Thor Agena D] 1964-08A	1964 Feb 15.90	Cylinder	8 long?	1964 Feb 17.7	74.95	90.86	6690	179	444	0.020	147
r?		23.0 days	1st 8 days 1590	1.5 dia	1964 Mar 5.5	74.95	89.5	6623	165	324	0.012	96
		1964 Mar 9.9	then 700									
D	Fragment 1964-08B											
D	[Atlas Agena D] 1964-09A	1964 Feb 25.79	Cylinder	8 long?	1964 Feb 26.4	95.66	88.24	6560	173	190	0.001	103
		4 days	2000?	1.5 dia								
		1964 Mar 1										
D	Fragment 1964-09B											
D	Cosmos 25 1964-10A	1964 Feb 27.56	Ellipsoid	1.8 long	1964 Feb 27.7	49.01	92.27	6769	255	526	0.020	121
		267.05 days	400?	1.2 dia	1964 Jun 10.5	48.97	91.40	6725	253	441	0.014	248
		1964 Nov 21.61			1964 Nov 7.3	49.0	89.69	6641	225	301	0.005	236
D	Cosmos 25 rocket 1964-10B	1964 Feb 27.56	Cylinder	8 long	1964 Feb 28.4	49.07	92.25	6768	234	545	0.023	127
		111.7 days	1500?	1.65 dia	1964 Jun 3.1	49.04	89.64	6639	227	294	0.005	220
		1964 Jun 18.3										
D	Fragments 1964-10C, D											
D	[Thor Agena D] 1964-11A	1964 Feb 28.14	Cylinder	8 long?	1964 Feb 29.1	82.03	94.74	6878	479	520	0.003	58
		1817.92 days	1500?	1.5 dia	1966 Oct 7.3	82.07	94.45	6870	485	499	0.001	347
		1969 Feb 19.06			1968 Jan 10.7	82.08	93.59	6828	444	456	0.001	140
D	Fragments 1964-11B-D											

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	Name	Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D	[Atlas Agena D] 1964-12A	1964 Mar 11.84 4.3 days 1964 Mar 16.1	Cylinder 2000?	8 long? 1.5 dia	1964 Mar 12.9	95.73	88.2	6561	163	203	0.003	123
D	Fragment 1964-12B											
D	Cosmos 26 1964-13A	1964 Mar 18.63 193.87 days 1964 Sep 28.50	Ellipsoid 400?	1.8 long 1.2 dia	1964 Mar 19.3 1964 Jun 20.4 1964 Sep 21.4	48.96 48.95 48.95	91.00 90.23 88.79	6705 6668 6598	266 250 207	387 330 233	0.009 0.006 0.002	122 212 304
D	Cosmos 26 rocket 1964-13B	1964 Mar 18.63 59.5 days 1964 May 17.1	Cylinder 1500?	8 long 1.65 dia	1964 Mar 22.8 1964 Apr 30.4	48.99 48.96	90.91 89.92	6702 6649	270 251	377 291	0.008 0.003	132 331
D	Fragments 1964-13C,D											
D	Cosmos 27* 1964-14A	1964 Mar 27.14 1.2 days 1964 Mar 28.3	Cylinder 6520? full	7 long? 2.0 max dia	1964 Mar 27.6	64.80	88.16	6561	167	198	0.002	323
D	Cosmos 27 rocket 1964-14B	1964 Mar 27.14 2.6 days 1964 Mar 29.7	Cylinder 2500?	7.5 long 2.6 dia	1964 Mar 28.5	64.80	88.22	6566	181	194	0.001	18
D	Fragments 1964-14C,D											

*Cosmos 27 is believed to have been a Zond probe launcher.

	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D	Ariel 2	1964-15A	1964 Mar 27.73 1330.95 days 1967 Nov 18.68	Cylinder + 4 paddles 68	0.9 long 0.58 dia	1964 Mar 28.4 1966 Oct 12.7 1967 Nov 10.0	51.64 51.63 51.51	101.29 97.75 90.15	7201 7031 6663	285 280 211	1362 1025 358	0.075 0.053 0.011	140 175 119
D	Ariel 2 rocket	1964-15B	1964 Mar 27.73 1111 days 1967 Apr 13	Cylinder 24	1.8 long 0.46 dia	1964 Mar 29.2 1966 Oct 15.5 1967 Apr 8.9	51.67 51.65 51.57	101.27 95.95 89.81	7200 6946 6646	282 275 221	1362 861 314	0.075 0.042 0.007	142 - 132
D	Fragment	1964-15C											
D	Zond 1 launcher	1964-16A	1964 Apr 2.12 1.5 days 1964 Apr 3.6	-	-	1964 Apr 2.5	64.83	88.47	6578	187	213	0.002	345
D	Zond 1 launcher rocket	1964-16B	1964 Apr 2.12 0.6 day 1964 Apr 2.7	Cylinder 2500?	7.5 long 2.6 dia	1964 Apr 2.5	65.22	88.10	6559	122	240	0.009	139
D	Fragment	1964-16C											
D R	Cosmos 28	1964-17A	1964 Apr 4.40 7.9 days 1964 Apr 12.3	Sphere-cylinder 4750?	4.3 long 2.4 dia	1964 Apr 4.8	65.04	90.37	6671	213	373	0.012	45
D	Cosmos 28 rocket	1964-17B	1964 Apr 4.40 28.7 days 1964 May 3.1	Cylinder 1440	3.8 long 2.6 dia	1964 Apr 4.9	65.01	90.48	6676	224	371	0.011	63
D	Fragment	1964-17C											

Space Vehicle: Zond 1, 1964-16D

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	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D	Gemini 1 -Titan rocket	1964-18A	1964 Apr 8.67 4.2 days 1964 Apr 12.9	Cone-cylinder 5170 payload 3000	11.6 long 3.0 dia	1964 Apr 9.5	32.56	89.00	6605	154	299	0.011	82
D	Polyot 2	1964-19B	1964 Apr 12.39 787.49 days 1966 Jun 8.88	Irregular 600?	2 long? 1 dia?	1964 Apr 14.1 1964 May 10.8 1965 Oct 8.5	59.92 58.06 58.01	91.86 92.31 91.31	6742 6769 6718	242 303 279	485 479 400	0.018 0.013 0.009	57 98 212
D	Polyot 2 rocket	1964-19A	1964 Apr 12.39 18.4 days 1964 Apr 30.8	-	-	1964 Apr 17.2	59.92	91.54	6729	236	465	0.017	63
D	[Atlas Agena D]	1964-20A	1964 Apr 23.78 5.2 days 1964 Apr 29.0	Cylinder 2000?	8 long? 1.5 dia	1964 Apr 25.5	103.56	89.40	6621	150	336	0.014	128
D	Fragments	1964-20B-E											
D R	Cosmos 29	1964-21A	1964 Apr 25.43 7.9 days 1964 May 3.3	Sphere-cylinder 4750?	4.3 long 2.4 dia	1964 Apr 28.2	65.01	89.50	6628	203	296	0.007	22
D	Cosmos 29 rocket	1964-21B	1964 Apr 25.43 15.9 days 1964 May 11.3	Cylinder 1440	3.8 long 2.6 dia	1964 Apr 28.3	65.04	89.56	6631	220	286	0.005	69
D	Fragments	1964-21C-E											

	Name	Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D	[Thor Agena D] 1964-22A	1964 Apr 27.98 28.19 days 1964 May 26.17	Cylinder 1500?	8 long? 1.5 dia	1964 May 1.1	79.93	90.77	6690	178	446	0.020	130
D R	Cosmos 30 1964-23A	1964 May 18.41 7.90 days 1964 May 26.31	Sphere-cylinder 5530 ?	5 long? 2.4 dia	1964 May 20.3	64.87	90.25	6664	206	366	0.012	38
D	Cosmos 30 1964-23B rocket	1964 May 18.41 20.3 days 1964 Jun 7.7	Cylinder 2500?	7.5 long 2.6 dia	1964 May 24.2	64.84	89.94	6650	205	338	0.010	24
D	[Atlas Agena D] 1964-24A	1964 May 19.81 2.9 days 1964 May 22.7	Cylinder 2000?	8 long? 1.5 dia	1964 May 20.7	101.12	89.69	6639	141	380	0.018	120
D	Saturn SA6 1964-25A (Apollo Model 1)	1964 May 28.71 3.31 days 1964 Jun 1.02	Cone-cylinder 16900	24.4 long 5.5 dia	1964 May 29.7	31.74	88.22	6570	179	204	0.002	122
	Transit 9 1964-26A [Blue Scout]	1964 Jun 4.16 70 years	Octagon + 4 vanes + boom 54	0.25 long 0.46 dia	1964 Jun 5.2	90.42	103.12	7283	854	956	0.007	99
	Altair rocket 1964-26D	1964 Jun 4.16 100 years	Cylinder 24	1.5 long 0.46 dia	1964 Jun 19.2	90.45	103.13	7283	854	956	0.007	-
	Fragments 1964-26B,C,E											
D	[Thor Agena D] 1964-27A	1964 Jun 4.96 13.94 days 1964 Jun 18.90	Cylinder 1500?	8 long? 1.5 dia	1964 Jun 7.1 1964 Jun 17.0	79.96 79.95	90.27 89.15	6667 6610	149 139	429 324	0.021 0.014	107 74

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	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D	Cosmos 31	1964-28A	1964 Jun 6.25 135.97 days 1964 Oct 20.22	Ellipsoid 400?	1.8 long 1.2 dia	1964 Jun 6.7 1964 Oct 8.5	48.93 48.97	91.61 89.40	6735 6626	222 195	492 301	0.020 0.008	112 353
D	Cosmos 31 rocket	1964-28B	1964 Jun 6.25 71.35 days 1964 Aug 16.60	Cylinder 1500?	8 long 1.65 dia	1964 Jun 8.2 1964 Aug 8.3	48.97 48.94	91.60 89.51	6733 6633	220 208	490 301	0.020 0.007	118 61
D R	Cosmos 32	1964-29A	1964 Jun 10.45 7.99 days 1964 Jun 18.44	Sphere-cylinder 4750?	4.3 long 2.4 dia	1964 Jun 10.9	51.24	89.76	6644	213	319	0.008	35
D	Cosmos 32 rocket	1964-29B	1964 Jun 10.45 34.43 days 1964 Jul 14.88	Cylinder 1440	3.8 long 2.6 dia	1964 Jun 12.4	51.30	89.93	6650	232	312	0.006	82
D	Fragment	1964-29C											
D	Starflash 1A [Thor Agena D]	1964-30A	1964 Jun 13.66 354.21 days 1965 Jun 2.87	Cylinder 2500?	8 long? 1.5 dia	1964 Jun 14.6 1964 Nov 2.5 1965 May 29.8	114.98 115.00 114.98	91.67 91.34 88.75	6735 6719 6590	350 334 205	364 348 218	0.001 0.001 0.001	216 329 286
D	Fragment	1964-30B											
	Capsule [Thor Agena D]	1964-31A	1964 Jun 18.20 500 years	Cylinder?	0.5 long? 1.0 dia?	1964 Jun 18.4	99.84	101.64	7213	828	842	0.001	334
	Agena D rocket	1964-31C	1964 Jun 18.20 500 years	Cylinder 700?	8 long? 1.5 dia	1964 Jun 30.5	99.85	101.63	7212	827	840	0.002	-
	Capsule	1964-31B	1964 Jun 18.20 500 years	Cylinder?	0.5 long? 1.0 dia?	1964 Jun 24.4	99.83	101.64	7213	828	842	0.001	135

Year of launch 1964, continued

	Name	Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D	[Thor Agena D] 1964-32A	1964 Jun 19.97 26.81 days 1964 Jul 16.78	Cylinder 1500?	8 long? 1.5 dia	1964 Jun 21.1 1964 Jul 10.5	85.0 84.99	90.95 89.60	6697 6631	176 173	462 332	0.021 0.012	- 56
D	Fragment 1964-32B											
D R	Cosmos 33 1964-33A	1964 Jun 23.43 7.93 days 1964 Jul 1.36	Sphere-cylinder 4750?	4.3 long 2.4 dia	1964 Jun 23.6	65.0	89.50	6629	209	293	0.006	-
D	Cosmos 33 rocket 1964-33B	1964 Jun 23.43 17.37 days 1964 Jul 10.80	Cylinder 1440	3.8 long 2.6 dia	1964 Jun 23.8	65.08	89.54	6630	219	285	0.005	42
D	Fragments 1964-33C,D											
D R	Cosmos 34 1964-34A	1964 Jul 1.47 7.93 days 1964 Jul 9.40	Sphere-cylinder 5530?	5 long? 2.4 dia	1964 Jul 3.4	64.89	89.98	6653	202	348	0.011	37
D	Cosmos 34 rocket 1964-34B	1964 Jul 1.47 13.89 days 1964 Jul 15.36	Cylinder 2500?	7.5 long 2.6 dia	1964 Jul 5.4	64.89	89.80	6644	193	339	0.011	24

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	Name	Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D	[Thor Agena D] 1964-35A	1964 Jul 3.06 1861.45 days 1969 Aug 7.51	Cylinder 1500?	8 long? 1.5 dia	1964 Jul 5.5 1968 Jan 13.2 1968 Oct 31.2	82.09 82.08 82.08	94.94 94.00 93.16	6893 6848 6807	501 456 424	529 483 434	0.002 0.002 0.001	228 101 -
D	[Atlas Agena D] 1964-36A	1964 Jul 6.91 2.0 days 1964 Jul 8.9	Cylinder 1500?	8 long? 1.5 dia	1964 Jul 7.4	92.89	89.20	6612	121	346	0.017	145
D	Capsule 1964-36B	1964 Jul 6.91 180.21 days 1965 Jan 3.12	Octagon? 60?	0.3 long? 0.9 dia?	1964 Jul 8.5 1964 Nov 26.2	92.97 92.93	91.2 90.31	6715 6666	297 261	377 314	0.006 0.004	253 42
D	Fragment 1964-36C											
D	[Thor Agena D] 1964-37A	1964 Jul 10.97 26.52 days 1964 Aug 6.49	Cylinder 1500?	8 long? 1.5 dia	1964 Jul 13.4	84.98	91.00	6699	180	461	0.021	133
	Elektron 3 1964-38A	1964 Jul 10.91 200 years	Cylinder and 6 paddles 350	1.2 long 0.8 dia	1964 Jul 14.3	60.79	168.17	10093	404	7025	0.328	61
	Elektron 4 1964-38B	1964 Jul 10.91 23 years	Cone-cylinder 444	2.4 long 1.8 dia	1964 Jul 14.5 1968 Jan 8.3 1972 Dec 1.0	60.80 58.76 63.44	1313.63 1313.78 1313.58	39737 39736 39733	457 1887 413	66261 64829 66296	0.828 0.792 0.829	70 91 -
	Elektron 4 rocket 1964-38D	1964 Jul 10.91 23 years	Cylinder 1440	3.8 long 2.6 dia	1964 Jul 15.9 1967 Dec 25.9 1973 Jan 1.0	60.96 58.73 63.34	1341.37 1341.22 1336.05	40289 40287 40184	471 1921 197	67350 65900 67415	0.830 0.794 0.836	71 90 -
2d	Fragments 1964-38C,E,F											

	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D R	Cosmos 35	1964-39A	1964 Jul 15.48 7.92 days 1964 Jul 23.40	Sphere-cylinder 475?	4.3 long 2.4 dia	1964 Jul 16.2	51.24	89.18	6616	218	258	0.003	23
D	Cosmos 35 rocket	1964-39B	1964 Jul 15.48 17.32 days 1964 Aug 1.80	Cylinder 1440	3.8 long 2.6 dia	1964 Jul 16.3	51.32	89.40	6627	216	282	0.005	130
D	Fragments	1964-39C,D											
	Vela 3 [Atlas Agena D]	1964-40A	1964 Jul 17.35 > million years	Icosahedron 150	1.4 dia	1964 Jul 17.4 1964 Dec 15.5	39.58 39.13	6022.6 6091.5	109653 110487	101959 103048	104591 105169	0.012 0.010	149 -
	Vela 4	1964-40B	1964 Jul 17.35 > million years	Icosahedron 150	1.4 dia	1964 Jul 17.4 1964 Dec 15.5	40.88 40.90	6007.0 6070.5	109462 110233	94436 94584	111775 113125	0.079 0.084	74 -
D	TRS 6	1964-40C	1964 Jul 17.35 18 months	Tetrahedron 2.0	0.2 side	1964 Jul 17.4 1964 Oct 24.9	36.7 38.6	2364 2350	58988 58555	220 590	105000 103764	0.888 0.881	147 159
D	Agena D rocket	1964-40D	1964 Jul 17.35 18 months	Cylinder 700?	6 long? 1.5 dia	orbit similar to 1964-40C							
D	Cosmos 36	1964-42A	1964 Jul 30.15 212.88 days 1965 Feb 28.03	Ellipsoid 400?	1.8 long 1.2 dia	1964 Aug 2.4 1964 Dec 8.9 1965 Feb 20.8	49.00 48.99 48.97	91.85 90.86 88.99	6747 6698 6606	261 239 203	477 400 253	0.016 0.012 0.004	127 22 28
D	Cosmos 36 rocket	1964-42B	1964 Jul 30.15 121.98 days 1964 Nov 29.13	Cylinder 1500?	8 long 1.65 dia	1964 Aug 4.7 1964 Oct 7.4 1964 Nov 24.0	49.02 49.00 48.99	91.83 91.12 89.22	6746 6710 6617	254 245 212	482 419 265	0.017 0.013 0.004	143 85 328

Space vehicle: Ranger 7, 1964-41A. Ranger 7 rocket (Agena B) is believed to be in a highly eccentric orbit.

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Year of launch 1964, continued

	Name	Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D	[Thor Agena D] 1964-43A	1964 Aug 5.97	Cylinder	8 long?	1964 Aug 6.9	79.96	90.71	6687	182	436	0.019	138
r?		26.0 days	1st 9 days	1.5 dia	1964 Aug 24.8	79.99	89.35	6619	175	307	0.010	68
		1964 Sep 1.0	1540, later 720									
D	Cosmos 37 1964-44A	1964 Aug 14.40	Sphere-cylinder	4.3 long	1964 Aug 15.8	64.92	89.41	6625	207	287	0.006	22
R		7.9 days	4750?	2.4 dia								
		1964 Aug 22.3										
D	Cosmos 37 1964-44B	1964 Aug 14.40	Cylinder	3.8 long	1964 Aug 15.8	65.01	89.54	6633	215	295	0.006	36
	rocket	19.64 days	1440	2.6 dia								
		1964 Sep 3.04										
D	[Atlas Agena D] 1964-45A	1964 Aug 14.92	Cylinder	8 long?	1964 Aug 17.6	95.52	89.0	6606	149	307	0.012	135
		8.8 days	1500?	1.5 dia								
		1964 Aug 23.7										
	Hitch-hiker 2 1964-45B	1964 Aug 14.92	Octagon	0.3 long?	1964 Aug 18.3	95.67	127.40	8390	275	3748	0.207	11
	(P.11)	15 years	79	0.9 dia?	1969 Sep 16.0	95.65	117.29	7941	265	2861	0.163	-
					1975 May 1.0	95.5	104.59	7356	254	1702	0.098	-
D	Fragment 1964-45C											

Year of launch 1964, continued

	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D	Cosmos 38	1964-46A	1964 Aug 18.39 82.4 days 1964 Nov 8.8	Ellipsoid? 50?	1.0 long? 0.8 dia?	1964 Aug 18.8 1964 Oct 3.5 1964 Nov 1.4	56.12 56.13 56.09	94.31 92.17 89.70	6866 6760 6641	206 193 190	769 571 336	0.041 0.028 0.011	60 157 233
D	Cosmos 39	1964-46B	1964 Aug 18.39 91.14 days 1964 Nov 17.53	Ellipsoid? 50?	1.0 long? 0.8 dia?	1964 Aug 18.8 1964 Oct 12.4 1964 Nov 11.4	56.10 56.10 56.10	94.59 91.93 89.52	6880 6751 6631	206 197 186	798 548 319	0.043 0.026 0.010	61 177 254
D	Cosmos 40	1964-46C	1964 Aug 18.39 92.50 days 1964 Nov 18.89	Ellipsoid? 50?	1.0 long? 0.8 dia?	1964 Aug 19.7 1964 Oct 5.6 1964 Nov 9.5	56.12 56.10 56.10	93.95 92.07 89.74	6851 6757 6643	206 196 185	740 561 345	0.039 0.027 0.012	61 162 247
D	Cosmos 38 rocket	1964-46D	1964 Aug 18.39 185.29 days 1965 Feb 19.68	Cylinder 2200?	7.4 long 2.4 dia	1964 Aug 19.8 1964 Dec 11.5 1965 Feb 14.8	56.12 56.15 56.11	95.13 92.51 89.09	6908 6778 6608	212 210 170	848 590 289	0.046 0.028 0.009	64 304 95
D	Fragments	1964-46E-G											
	Syncom 3	1964-47A	1964 Aug 19.51 >million years	Cylinder 39	0.39 long 0.71 dia	1964 Aug 22.2 1964 Dec 15.5 1970 Oct 1.0	0.10 0.07 4.9	1407.8 1436.5 1437.3	41609 42177 42189	34191 35790 35718	36271 35799 35903	0.025 0 0.002	117 - -
	Syncom 3 rocket	1964-47B	1964 Aug 19.51 100 000 years	Cylinder 24	1.5 long 0.46 dia	1964 Aug 20.2	16.80	694.5	25977	1113	38084	0.712	181
D	Starflash 1B [Thor Agena D]	1964-48A	1964 Aug 21.66 221.66 days 1965 Mar 31.32	Cylinder 1500?	8 long? 1.5 dia	1964 Aug 25.6 1964 Dec 5.5 1965 Mar 27.2	115.0 115.0 114.96	91.60 90.90 89.15	6734 6697 6604	349 305 219	363 332 232	0.001 0.002 0.001	108 50 336

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	Name	Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
	Cosmos 41 1964-49D	1964 Aug 22.30 46 years	Cylinder + 6 vanes 1000?	3.4 long 1.6 dia	1964 Sep 10.7 1965 Aug 14.7	64.88 66.06	714.58 714.30	26477 26473	426 796	39771 39394	0.743 0.729	326 318
D	Cosmos 41 1964-49A launcher rocket	1964 Aug 22.30 24.24 days 1964 Sep 15.54	Cylinder 2500?	7.5 long 2.6 dia	1964 Aug 23.7	64.74	91.06	6706	200	455	0.019	66
D	Cosmos 41 1964-49B launcher	1964 Aug 22.30 37 days 1964 Sep 28	Irregular	-	1964 Aug 31.5	64.73	91.19	6712	197	471	0.020	-
	Cosmos 41 1964-49E rocket	1964 Aug 22.30 46 years	Cylinder 440	2.0 long 2.0 dia	1966 Aug 27	67.52	718.93	26564	998	39373	0.722	-
D	Fragment 1964-49C											
D	Cosmos 42 1964-50A	1964 Aug 22.46 484.14 days 1965 Dec 19.60	Ellipsoid? 100?	1.0 long? 0.8 dia?	1964 Aug 23.2 1964 Dec 8.9 1965 Oct 21.3	48.96 48.96 48.93	98.05 96.84 92.07	7047 6989 6757	230 226 210	1113 995 548	0.062 0.055 0.025	110 196 153
D	Cosmos 42 1964-50B rocket	1964 Aug 22.46 345.21 days 1965 Aug 2.67	Cylinder 1500?	8 long 1.65 dia	1964 Aug 23.4 1964 Dec 12.2 1965 Jul 22.8	48.97 48.97 48.97	97.31 96.14 89.87	7040 6955 6648	224 222 203	1098 931 336	0.062 0.051 0.010	112 215 316
D	Cosmos 43 1964-50C	1964 Aug 22.46 492.37 days 1965 Dec 27.83	Ellipsoid? 100?	1.0 long? 0.8 dia?	1964 Aug 23.3 1964 Dec 6.3 1965 Oct 20.7	48.96 48.97 48.92	98.00 96.82 92.21	7042 6988 6764	227 225 216	1100 994 555	0.062 0.055 0.025	111 186 150
	Explorer 20 1964-51A	1964 Aug 25.57 800 years	Double cone 44	0.83 long 0.66 dia	1964 Aug 31.0 1965 Dec 12.3	79.87 79.91	103.97 103.97	7323 7323	871 864	1018 1025	0.010 0.011	289 146
	Explorer 20 1964-51B rocket	1964 Aug 25.57 500 years	Cylinder 24	1.5 long 0.46 dia	1964 Aug 26.6	79.93	103.92	7321	877	1009	0.009	300
D	Fragments 1964-51C-E											

Year of launch 1964, continued

	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D	Nimbus 1	1964-52A	1964 Aug 28.33 3548.55 days 1974 May 16.88	Conical skeleton + 2 paddles 376	3.00 long 1.45 dia	1964 Aug 28.8 1969 Sep 16.0 1971 Dec 1.0	98.66 98.66 98.66	98.42 96.48 94.56	7061 6968 6876	429 412 385	937 768 611	0.036 0.025 0.016	158 - -
D	Nimbus 1 rocket	1964-52B	1964 Aug 28.33 3637.22 days 1974 Aug 13.55	Cylinder 700?	6 long 1.5 dia	1964 Sep 15.5 1968 Jan 15.5 1972 Mar 1.0	98.68 98.68 98.68	98.40 97.65 94.57	7060 7024 6877	429 425 388	934 867 609	0.036 0.031 0.016	- - -
	Cosmos 44	1964-53A	1964 Aug 28.68 50 years	Cylinder + 2 vanes	3 long? 1 dia?	1964 Aug 29.3	65.04	99.48	7114	615	857	0.017	23
	Cosmos 44 rocket	1964-53B	1964 Aug 28.68 50 years	Cylinder 1440	3.8 long 2.6 dia	1964 Aug 30.1	65.05	99.54	7117	682	796	0.008	45
	OGO 1*	1964-54A	1964 Sep 5.90 16 years	Box + booms 487	1.73 long 0.84 wide 0.84 high	1964 Sep 7.8 1969 Sep 16.0 1970 Jun 1.0	31.15 57.50 58.8	3838.8 3842.8 3840.1	81211 81270 81232	281 35743 45880	149385 114040 103827	0.918 0.482 0.357	313 - -
	OGO 1 rocket	1964-54B	1964 Sep 5.90 16 years	Cylinder 700?	6 long 1.5 dia	Orbit similar to 1964-54A							
D R	Cosmos 45	1964-55A	1964 Sep 13.41 4.9 days 1964 Sep 18.3	Sphere-cylinder 553?	5 long? 2.4 dia	1964 Sep 14.6	64.89	89.68	6638	207	313	0.008	36
D	Cosmos 45 rocket	1964-55B	1964 Sep 13.41 14.45 days 1964 Sep 27.86	Cylinder 2500?	7.5 long 2.6 dia	1964 Sep 14.5	64.88	89.60	6634	203	309	0.008	36
D r?	[Thor Agena D]	1964-56A	1964 Sep 14.95 21.7 days 1964 Oct 6.7	Cylinder 1st 11 days 1330, later 580	8 long? 1.5 dia	1964 Sep 16.1	84.96	90.88	6697	172	466	0.022	135
D	Fragment	1964-56B											

* Orbiting Geophysical Observatory.

Continued on page 60

Year of launch 1964, continued

	Name	Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D	Saturn SA7 1964-57A (Apollo Model 2)	1964 Sep 18.68 3.86 days 1964 Sep 22.54	Cylinder 16700	24.4 long 5.5 dia	1964 Sep 20.3	31.72	88.30	6568	178	203	0.002	142
D	[Atlas Agena D] 1964-58A	1964 Sep 23.84 4.78 days 1964 Sep 28.62	Cylinder 2000?	8 long? 1.5 dia	1964 Sep 25.2	92.91	89.00	6602	145	303	0.012	173
D	Fragment 1964-58B											
D R	Cosmos 46 1964-59A	1964 Sep 24.50 8.02 days 1964 Oct 2.52	Sphere-cylinder 4750?	4.3 long 2.4 dia	1964 Sep 25.5	51.25	89.22	6616	211	264	0.004	16
D	Cosmos 46 rocket 1964-59B	1964 Sep 24.50 13.22 days 1964 Oct 7.72	Cylinder 1440	3.8 long 2.6 dia	1964 Sep 25.5	51.27	89.40	6624	234	259	0.002	125
D	Explorer 21 (Imp 2) 1964-60A	1964 Oct 4.16 15 months 1966 Jan	Octagon + 4 vanes 62	0.20 long 0.71 dia	1964 Oct 4.2 1964 Dec 15.5 **1965 Oct 15.5**	33.53 33.77 **33.72**	2097 2080 **2080**	54271 53971 **53981**	190 362 **917**	95595 94825 **94288**	0.879 0.875 **0.865**	133 - -
D	Explorer 21 rocket 1964-60B	1964 Oct 4.16 1½ years?	Cylinder 24	1.5 long 0.46 dia	Orbit similar to 1964-60A							
D r?	[Thor Agena D] 1964-61A	1964 Oct 5.91 20.50 days 1964 Oct 26.41	Cylinder 1500?	8 long? 1.5 dia	1964 Oct 7.3	79.97	90.75	6689	182	440	0.019	158

Year of launch 1964, continued

	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D R	Cosmos 47*	1964-62A	1964 Oct 6.30 1.0 days 1964 Oct 7.3	Sphere-cylinder 5000?	6 long? 2.4 dia	1964 Oct 6.7	64.62	90.07	6657	174	383	0.016	72
D	Cosmos 47 rocket	1964-62B	1964 Oct 6.30 7.9 days 1964 Oct 14.2	Cylinder 2500?	7.5 long 2.6 dia	1964 Oct 7.2	64.71	89.92	6649	168	373	0.015	67
D	Fragments	1964-62C-E											
	Ablestar rocket	1964-63A	1964 Oct 6.71 1500 years	Cylinder 450?	4.8 long 1.4 dia	1964 Oct 10.8	89.92	106.38	7436	1035	1080	0.003	57
	Transit 5B-4	1964-63B	1964 Oct 6.71 1000 years	Octagon + boom 60?	0.5 long 0.46 dia	1964 Dec 21.2	89.92	106.65	7448	1055	1085	0.002	156
	Calsphere 1 **	1964-63C	1964 Oct 6.71 200 years	Sphere 0.98	0.36 dia	1964 Oct 13.0	89.93	106.63	7447	1054	1084	0.002	29
	Calsphere 2	1964-63E	1964 Oct 6.71 2000 years	Sphere 9.8	0.36 dia	1964 Oct 14.5	89.97	106.66	7449	1056	1086	0.002	32
	Fragments	1964-63D,F											
L	Explorer 22 (Beacon B)	1964-64A	1964 Oct 10.13 250 years	Octagon + 4 vanes 52	0.30 long 0.46 dia	1964 Oct 13.3	79.69	104.82	7363	889	1081	0.013	138
	Explorer 22 rocket	1964-64B	1964 Oct 10.13 300 years	Cylinder 24	1.5 long 0.46 dia	1964 Oct 20.9	79.69	104.75	7362	888	1079	0.013	119
	Fragments	1964-64C,D											

* Voskhod test flight. ** Calibration sphere.

Continued on page 62

Year of launch 1964, continued

	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D 3M R	Voskhod 1	1964-65A	1964 Oct 12.31 1.01 days 1964 Oct 13.32	Sphere-cylinder 5320	6 long? 2.4 dia	1964 Oct 12.7	64.90	90.04	6655	177	377	0.015	65
D	Voskhod 1 rocket	1964-65B	1964 Oct 12.31 8.1 days 1964 Oct 20.4	Cylinder 2500?	7.5 long 2.6 dia	1964 Oct 15.7	64.77	89.39	6627	169	328	0.012	57
D	Fragment	1964-65C											
D R	Cosmos 48	1964-66A	1964 Oct 14.41 5.96 days 1964 Oct 20.37	Sphere-cylinder 4750?	4.3 long 2.4 dia	1964 Oct 15.8	65.08	89.32	6622	204	284	0.006	21
D	Cosmos 48 rocket	1964-66B	1964 Oct 14.41 13.84 days 1964 Oct 28.25	Cylinder 1440	3.8 long 2.6 dia	1964 Oct 15.5	65.06	89.53	6629	211	291	0.006	23
D	Fragment	1964-66C											
D	[Thor Agena D]	1964-67A	1964 Oct 17.92 17.27 days 1964 Nov 4.19	Cylinder 1500?	8 long? 1.5 dia	1964 Oct 19.1	74.99	90.59	6681	189	416	0.017	147
D	[Atlas Agena D]	1964-68A	1964 Oct 23.77 5.06 days 1964 Oct 28.83	Cylinder 1500?	8 long? 1.5 dia	1964 Oct 24.6	95.55	88.62	6583	139	271	0.010	169
D	Capsule	1964-68B	1964 Oct 23.77 123.22 days 1965 Feb 23.99	Octagon? 60?	0.3 long? 0.9 dia?	1964 Oct 27.9 1964 Dec 22.8 1965 Feb 22.0	95.50 95.49 95.45	91.14 90.59 88.53	6708 6680 6579	323 288 198	336 315 203	0.001 0.002 0.0004	330 78 247
D	Fragments	1964-68C,D											

Year of launch 1964, continued

	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D	Cosmos 49	1964-69A	1964 Oct 24.22 301.77 days 1965 Aug 21.99	Ellipsoid 400?	1.8 long 1.2 dia	1964 Oct 24.7 1964 Dec 16.4 1965 Aug 16.8	48.99 48.34 48.93	91.78 91.60 88.63	6743 6734 6588	264 255 197	466 457 223	0.015 0.015 0.002	117 7 119
D	Cosmos 49 rocket	1964-69B	1964 Oct 24.22 109.46 days 1964 Feb 10.68	Cylinder 1500?	8 long 1.65 dia	1964 Oct 24.7 1964 Dec 3.4 1964 Feb 6.4	48.94 48.93 48.92	91.85 91.26 89.22	6746 6717 6614	260 251 209	477 426 262	0.016 0.013 0.004	117 306 276
D	Fragment	1964-69C											
D P	Cosmos 50	1964-70A	1964 Oct 28.45 8.0 days 1964 Nov 5.5	Sphere-cylinder 4750?	4.3 long* 2.4 dia	1964 Oct 29.7	51.23	88.67	6588	190	230	0.003	312
D	Cosmos 50 rocket	1964-70B	1964 Oct 28.45 4.7 days 1964 Nov 2.2	Cylinder 1440	3.8 long 2.6 dia	1964 Oct 29.7	51.24	88.74	6592	187	240	0.004	192
D	Fragments	1964-70C-DA											
D	[Thor Agena D]	1964-71A	1964 Nov 2.90 25.33 days 1964 Nov 28.23	Cylinder 1500?	8 long? 1.5 dia	1964 Nov 3.6	79.95	90.70	6652	180	448	0.020	155
D	[Thor Agena D]	1964-72A	1964 Nov 4.09 1827.53 days 1969 Nov 5.62	Cylinder 1500?	8 long? 1.5 dia	1964 Nov 5.1 1968 Jan 11.5 1968 Dec 16.0	82.00 82.04 82.04	95.05 94.21 93.32	6897 6859 6815	512 477 431	526 435 442	0.001 0.001 0.001	303 179 -
D	Fragments	1964-72B-D											

*Size before explosion on Nov 5.

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Year of launch 1964, continued

	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi Major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
	Explorer 23	1964-74A	1964 Nov 6.50 25 years	Cylinder 134	2.34 long 0.62 dia	1964 Nov 6.5 1973 Feb 1.0	51.95 51.95	99.17 97.86	7100 7036	466 451	977 865	0.036 0.029	138 -
D	Fragments*	1964-74B-E											
D r?	ORBIS** [Thor Agena D]	1964-75A	1964 Nov 18.86 17.45 days 1964 Dec 6.31	Cylinder 1500?	8 long? 1.5 dia	1964 Nov 21.7	70.02	89.71	6638	180	339	0.012	100
D	Explorer 24	1964-76A	1964 Nov 21.72 1427 days 1968 Oct 18	Inflated-sphere 8.6	3.65 dia	1964 Nov 21.8 1965 Oct 7.3 1968 Jan 13.3	81.36 81.40 81.36	116.30 115.70 106.57	7889 7864 7446	525 589 539	2498 2382 1596	0.125 0.114 0.071	166 193 73
	Explorer 25 (Injun 4)	1964-76B	1964 Nov 21.72 200 years	Spheroid 40	0.76 long 0.61 dia	1964 Nov 21.8	81.36	116.27	7886	522	2494	0.125	166
	Explorer 24 rocket	1964-76C	1964 Nov 21.72 100 years	Cylinder 24	1.5 long 0.46 dia	1964 Dec 15.5	81.36	116.35	7891	531	2495	0.124	-
4d	Fragments	1964-76D-N											
D	Zond 2 launcher	1964-78A	1964 Nov 30.55 1.23 days 1964 Dec 1.78	-	-	1964 Nov 30.9	64.72	88.16	6564	153	219	0.005	313
D	Zond 2 launcher rocket	1964-78B	1964 Nov 30.55 2.10 days 1964 Dec 2.65	Cylinder 2500?	7.5 long 2.6 dia	1964 Dec 1.5	64.73	88.15	6562	177	190	0.001	317
D	[Atlas Agena D]	1964-79A	1964 Dec 4.79 1.2 days 1964 Dec 6.0	Cylinder 2000?	8 long? 1.5 dia	1964 Dec 5.2	97.02	89.69	6636	158	357	0.015	-

Space Vehicles: Mariner 3, 1964-73; Mariner 4, 1964-77A, and a rocket 1964-77B; Zond 2, 1964-78C.

* Fragments 1964-74D and 74E, designated in the USA about 17 Jul 1973, probably belong to the 1973-27 launch.

** Orbiting radio beacon ionospheric satellite.

	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D	Cosmos 51	1964-80A	1964 Dec 9.96 339.93 days 1965 Nov 14.89	Ellipsoid 400?	1.8 long 1.2 dia	1964 Dec 11.9 1965 Jun 20.5 1965 Nov 10.2	48.78 48.73 48.73	92.44 91.28 88.68	6776 6718 6590	262 246 192	533 434 231	0.020 0.014 0.003	130 319 312
D	Cosmos 51 rocket	1964-80B	1964 Dec 9.96 152.4 days 1965 May 11.4	Cylinder 1500?	8 long 1.65 dia	1964 Dec 11.9 1965 Mar 12.3 1965 May 8.3	48.78 48.75 48.74	92.46 91.38 88.90	6778 6723 6601	257 244 203	542 446 243	0.021 0.015 0.003	129 207 138
D	Fragments	1964-80C-F											
D P	Transtage 2 [Titan 3A]	1964-81A	1964 Dec 10.70 2.95 days 1964 Dec 13.65	Cylinder 1700	6 long 3 dia	1964 Dec 12.3	32.15	87.60	6542	157	170	0.001	280
D	Centaur AC4	1964-82A	1964 Dec 11.60 0.63 day 1964 Dec 12.23	Cylinder 2950	14 long 3.0 dia	1964 Dec 11.7	30.71	87.81	6550	165	178	0.001	183
	Ablestar rocket	1964-83A	1964 Dec 13.01 500 years	Cylinder 450?	4.8 long 1.4 dia	1964 Dec 16.1 1966 Nov 30.5	89.99 89.95	106.06 106.20	7420 7427	1012 1024	1071 1073	0.004 0.003	352 -
	Radiation satellite (SN-43)	1964-83C	1964 Dec 13.01 1000 years	Octagonal prism 78	0.92 long 0.46 dia	1964 Dec 24.5	89.99	106.36	7435	1027	1086	0.004	286
	Transit 5B-5 [Thor Ablestar]	1964-83D	1964 Dec 13.01 1000 years	Octagon + boom 73?	0.5 long 0.46 dia	1964 Dec 24.8	89.86	106.33	7433	1025	1084	0.004	13
	Fragments	1964-83B,E-M											

	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D	San Marco 1	1964-84A	1964 Dec 15.85 270.12 days 1965 Sep 11.97	Sphere 115	0.66 dia	1964 Dec 16.9 1965 Apr 30.3 1965 Sep 9.5	37.77 37.77 37.75	94.94 92.64 88.48	6900 6788 6582	198 193 164	846 627 243	0.047 0.032 0.006	113 158 242
D	San Marco 1 rocket	1964-84B	1964 Dec 15.85 53.2 days 1965 Feb 7.1	Cylinder 24	1.5 long 0.46 dia	1964 Dec 31.5 1965 Jan 31.5	37.80 37.76	93.40 90.39	6824 6678	194 186	697 411	0.037 0.017	- -
D	Fragment	1964-84C											
D	[Thor Agena D]	1964-85A	1964 Dec 19.88 26.06 days 1965 Jan 14.94	Cylinder 1500?	8 long? 1.5 dia	1964 Dec 22.9 1965 Jan 12.9	74.97 74.95	90.46 88.74	6675 6590	183 166	410 258	0.017 0.007	153 86
	Explorer 26	1964-86A	1964 Dec 21.38 15 years	Octagon + 4 vanes 46	0.43 long 0.71 dia	1964 Dec 21.4 1965 Oct 6.2 1973 Mar 1.0 1976 Sep 1.0	20.14 19.86 18.0 18.1	456.26 451.98 282.6 184.5	19632 19515 14264 10736	316 276 368 171	26191 25997 15404 8545	0.659 0.659 0.527 0.390	121 67 - -
D	Explorer 26 rocket	1964-86B	1964 Dec 21.38 2898 days 1972 Feb 1	Cylinder 24	1.5 long 0.46 dia	orbit similar to 1964-86A							
	Fragment*	1964-86C											
D	[Thor Agena D]	1964-87A	1964 Dec 21.80 21.64 days 1965 Jan 11.44	Cylinder 1500?	8 long? 1.5 dia	1964 Dec 25.1	70.08	89.5	6629	238	264	0.002	111

* Fragment 1964-86C, designated on 1972 Apr 15, is probably the rediscovered satellite 1964-86A (lost during 1965 Oct).

Year of launch 1965

	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D R	Cosmos 52	1965-01A	1965 Jan 11.40 7.89 days 1965 Jan 19.29	Sphere-cylinder 4750?	4.3 long 2.4 dia	1965 Jan 11.8	65.00	89.50	6628	203	298	0.007	18
D	Cosmos 52 rocket	1965-01B	1965 Jan 11.40 18.21 days 1965 Jan 29.61	Cylinder 1440	3.8 long 2.6 dia	1965 Jan 13.8	64.98	89.53	6633	215	295	0.006	75
D	Fragments	1965-01C,D											
D r?	[Thor Agena D]	1965-02A	1965 Jan 15.88 25.0 days 1965 Feb 9.9	Cylinder 1st 10 days 1290, later 580	8 long? 1.5 dia	1965 Jan 21.8	74.95	90.52	6678	180	420	0.018	128
D	Fragment	1965-02B											
	[Thor Altair]	1965-03A	1965 Jan 19.21 20 years	Cylinder 150?	2 long? 0.5 dia?	1965 Jan 20.1 1972 Jan 1.0	98.78 98.77	97.68 95.80	7025 6933	471 434	822 675	0.025 0.017	272 -
D	Fragments	1965-03B,C											
	Tiros 9	1965-04A	1965 Jan 22.33 1000 years	Cylinder 138	0.56 long 1.07 dia	1965 Jan 31.2	96.40	119.23	8022	705	2582	0.117	166
	Tiros 9 rocket	1965-04B	1965 Jan 22.33 200 years	Cylinder 24	1.5 long 0.46 dia	1965 Feb 1.5	96.43	119.32	8028	710	2589	0.117	163
	Fragments	1965-04C,D											
D	[Atlas Agena D]	1965-05A	1965 Jan 23.84 5.2 days 1965 Jan 29.0	Cylinder 2000?	8 long? 1.5 dia	1965 Jan 25.1	102.5	88.85	6597	146	291	0.011	131
D	Fragment	1965-05B											

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Year of launch 1965 continued

	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D	Cosmos 53	1965-06A	1965 Jan 30.40 558.84 days 1966 Aug 12.24	Ellipsoid 400?	1.8 long 1.2 dia	1965 Jan 30.9 1965 Oct 30.0 1966 Jul 29.1	48.72 48.70 48.67	98.71 95.94 89.98	7077 6944 6654	218 212 189	1180 920 362	0.068 0.051 0.013	107 175 345
D	Cosmos 53 rocket	1965-06B	1965 Jan 30.40 346.10 days 1966 Jan 11.50	Cylinder 1500?	8 long 1.65 dia	1965 Jan 31.3 1965 Jun 21.0 1965 Sep 30.5	48.72 48.73 48.70	98.64 96.46 94.53	7075 6970 6874	230 222 214	1164 961 778	0.066 0.053 0.041	109 342 -
D	Fragments	1965-06C,D											
	OSO 2	1965-07A	1965 Feb 3.69 30 years	Nonagonal box 247	0.94 long 1.12 dia	1965 Feb 3.7 1968 Jan 3.6	32.87 32.86	96.40 96.18	6970 6961	550 541	634 625	0.006 0.006	118 252
D	OSO 2 rocket	1965-07B	1965 Feb 3.69 4603 days 1977 Sep 11	Cylinder 24	1.5 long 0.46 dia	1965 Feb 15.5 1969 Sep 16.0 1973 Jul 1.0	32.86 32.84 32.8	96.41 95.59 93.90	6971 6931 6849	545 519 451	640 586 490	0.007 0.005 0.003	- - -
	Transtage 3 [Titan 3A]	1965-08A	1965 Feb 11.72 50000 years	Cylinder 3700	6 long 3 dia	1965 Feb 14.5	32.15	145.47	9167	2776	2802	0.001	302
	LES 1 *	1965-08C	1965 Feb 11.72 50000 years	Polyhedron 31	0.6 dia	1965 Feb 19.7	32.15	145.55	9171	2774	2811	0.002	315
	Fragment	1965-08B											
	Pegasus 1 [Saturn SA9]	1965-09A	1965 Feb 16.61 14 years	Cylinder + wings 10400	29.2 long 4.3 wide	1965 Feb 18.8 1969 Nov 16.0 1974 Aug 19.8	31.73 31.75 31.7	96.80 95.81 94.06	6992 6944 6860	495 477 433	733 654 531	0.017 0.013 0.007	156 - -
	Apollo Model 3	1965-09B	1965 Feb 16.61 30 years	Cone-cylinder 4600	9 long 3.91 dia	1965 Feb 20.4 1968 Jan 15.5	31.76 31.74	96.90 96.72	6995 6987	498 496	736 722	0.017 0.016	172 -

Space Vehicle: Ranger 8, 1965-10A. Ranger 8 rocket, 1965-10B is believed to be in a highly eccentric orbit.

* Lincoln Experimental Satellite.

	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi Major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D	Cosmos 54	1965-11A	1965 Feb 21.46 1302.42 days 1968 Sep 15.88	Ellipsoid? 60?	1.0 long? 0.8 dia?	1965 Feb 25.7 1966 Nov 5.5 1968 Jan 5.7	56.03 56.01 56.03	104.90 101.96 96.80	7370 7232 6985	256 254 251	1729 1454 963	0.100 0.083 0.051	106 115 212
D	Cosmos 55	1965-11B	1965 Feb 21.46 1075.97 days 1968 Feb 2.43	Ellipsoid? 50?	1.0 long? 0.8 dia?	1965 Feb 25.2 1966 Nov 7.4 1968 Jan 15.4	56.02 56.00 55.99	105.22 101.39 91.14	7385 7206 6711	261 259 219	1753 1397 447	0.101 0.079 0.017	110 123 281
D	Cosmos 56	1965-11C	1965 Feb 21.46 984.52 days 1967 Nov 2.98	Ellipsoid? 50?	1.0 long? 0.8 dia?	1965 Feb 24.5 1966 Nov 8.9 1967 Oct 30.8	56.04 56.01 55.96	104.52 99.96 89.42	7352 7137 6627	261 252 189	1687 1266 308	0.097 0.071 0.009	108 147 162
D	Cosmos 54 rocket	1965-11D	1965 Feb 21.46 1766.29 days 1969 Dec 23.75	Cylinder 2200?	7.4 long 2.4 dia	1965 Feb 24.4 1966 Nov 6.1 1968 Mar 13.7	56.04 56.04 56.06	106.21 104.45 100.62	7431 7349 7169	273 265 262	1833 1676 1319	0.105 0.096 0.074	110 78 240
D	Fragment	1965-11E											
D	Cosmos 57	1965-12A	1965 Feb 22.32 0.1 day 1965 Feb 22.4	Sphere-cylinder* 5500?	6 long?* 2.4 dia	1965 Feb 22.4	64.74	90.42	6674	165	427	0.020	64
D	Cosmos 57 rocket	1965-12B	1965 Feb 22.32 11 days 1965 Mar 5	Cylinder 2500?	7.5 long 2.6 dia	1965 Feb 25.6	64.74	90.42	6674	178	416	0.018	69
D	Fragments	1965-12C-FZ											

*Before disintegration (Voskhod test flight).

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Year of launch 1965 continued

	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D	[Thor Agena D]	1965-13A	1965 Feb 25.91 20.92 days 1965 Mar 18.83	Cylinder 1500?	8 long? 1.5 dia	1965 Feb 26.1	75.08	90.07	6655	177	377	0.015	163
D	Fragment	1965-13B											
	Cosmos 58	1965-14A	1965 Feb 26.21 50 years	Cylinder + 2 vanes 2000?	5 long? 1.5 dia?	1965 Feb 27.2	65.00	96.78	6983	563	647	0.006	258
	Cosmos 58 rocket	1965-14B	1965 Feb 26.21 30 years	Cylinder 1440	3.8 long 2.6 dia	1965 Feb 28.1	65.05	96.90	6988	512	708	0.014	205
D R	Cosmos 59	1965-15A	1965 Mar 7.38 7.92 days 1965 Mar 15.30	Sphere-cylinder 5530?	5 long? 2.4 dia	1965 Mar 7.5	64.97	89.78	6642	217	310	0.007	63
D	Cosmos 59 rocket	1965-15B	1965 Mar 7.38 12 days 1965 Mar 19	Cylinder 2500?	7.5 long 2.6 dia	1965 Mar 18.1	64.96	88.27	6568	170	210	0.003	296
D	Fragment	1965-15C											

Year of launch 1965 continued

Name	Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
SR 6B 1965-16A (Greb)	1965 Mar 9.77 1000 years	Sphere? 40?	0.6 dia?	1965 May 3.5	70.09	103.52	7303	910	939	0.002	209
GGSE 2 1965-16B	1965 Mar 9.77 500 years	Ellipsoid 4?	0.3 dia?	1965 Apr 29.0	70.11	103.50	7302	902	946	0.003	205
GGSE 3 1965-16C	1965 Mar 9.77 500 years	Ellipsoid 4?	0.3 dia?	1965 May 4.1	70.09	103.52	7303	910	939	0.002	203
SR 7B 1965-16D (Greb)	1965 Mar 9.77 1000 years	Sphere 47	0.61 dia	1965 Apr 27.7	70.09	103.52	7303	910	939	0.002	212
Secor 3 1965-16E (EGRS 3)	1965 Mar 9.77 1000 years	Rectangular box 18	0.4 x 0.3 x 0.2	1965 May 4.4	70.08	103.51	7302	909	938	0.002	208
Oscar 3 1965-16F	1965 Mar 9.77 1000 years	Rectangular box 13.6	0.4 x 0.3 x 0.2	1965 May 4.5	70.12	103.50	7302	902	946	0.003	211
Surcal 2 1965-16G	1965 Mar 9.77 25 years	Rectangular box? 5?	0.4 x 0.3 x 0.2?	1965 Apr 17.0	70.06	103.50	7301	901	945	0.003	189
				1972 Jan 1.0	70.06	102.50	7252	856	892	0.002	-
Dodecapole 1 1965-16H	1965 Mar 9.77 200 years	Dodecahedron 4?	0.6 dia?	1965 May 1.0	70.08	103.51	7303	910	939	0.002	194
Agena D rocket 1965-16J	1965 Mar 9.77 500 years	Cylinder 700?	6 long? 1.5 dia	1965 Apr 24.6	70.09	103.48	7301	908	937	0.002	223

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	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D	Capsule	1965-17A	1965 Mar 11.57 94.72 days 1965 Jun 14.29	-	-	1965 Apr 12.2 1965 Jun 8.1	89.97 89.98	95.19 90.67	6929 6683	211 191	890 418	0.049 0.017	7 118
D	Secor 2 (EGRS 2)	1965-17B	1965 Mar 11.57 1081.76 days 1968 Feb 26.33	Rectangular box 18	0.4 x 0.3 x 0.2	1965 May 3.8 1966 Nov 8.0 1968 Jan 15.2	89.98 89.98 89.94	97.85 96.20 91.40	7033 6952 6721	296 283 249	1014 866 437	0.051 0.042 0.014	269 72 200
D	Ablestar rocket	1965-17C	1965 Mar 11.57 906.89 days 1967 Sep 4.46	Cylinder 450?	4.8 long 1.4 dia	1965 Mar 19.6 1966 Sep 21.6 1967 Aug 21.7	90.00 89.98 90.10	97.96 95.95 90.19	7038 6940 6660	287 284 222	1033 839 342	0.053 0.040 0.009	93 231 8
D	[Thor Ablestar]	1965-17D	1965 Mar 11.57 870 days 1967 Jul 29	-	-	1965 Mar 13.7 1966 Nov 18.9 1967 Jul 22.9	89.99 90.00 90.02	97.97 95.20 89.30	7040 6904 6615	289 277 210	1035 774 263	0.053 0.036 0.004	92 15 119
D	Fragments	1965-17E-H											
D	Cosmos 60*	1965-18A	1965 Mar 12.40 5 days 1965 Mar 17	Cylinder 6530? full	7 long? 2.0 max dia	1965 Mar 13.6	64.72	88.93	6600	195	248	0.004	54
D	Cosmos 60 rocket	1965-18B	1965 Mar 12.40 4.5 days 1965 Mar 16.9	Cylinder 2500?	7.5 long 2.6 dia	1965 Mar 14.7	64.74	88.45	6577	192	205	0.001	67
D	Fragment	1965-18C											
D	[Atlas Agena D]	1965-19A	1965 Mar 12.81 4.98 days 1965 Mar 17.79	Cylinder 2000?	8 long? 1.5 dia	1965 Mar 15.3	107.69	88.51	6579	155	247	0.007	119
D	Fragments	1965-19B,C											

*Probably Luna Probe Launcher. (Payload about 1450 kg).

	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D	Cosmos 61	1965-20A	1965 Mar 15.46 1036.05 days 1968 Jan 15.51	Ellipsoid? 50?	1.0 long? 0.8 dia?	1965 Mar 17.4 1966 Nov 7.7 1968 Jan 13.4	56.02 55.99 55.95	105.02 101.02 88.99	7378 7188 6604	262 256 180	1738 1363 272	0.100 0.077 0.007	107 91 263
D	Cosmos 62	1965-20B	1965 Mar 15.46 1288.69 days 1968 Sep 24.15	Ellipsoid? 60?	1.0 long? 0.8 dia?	1965 Mar 17.1 1966 Nov 3.7 1968 Jan 15.1	56.03 55.99 56.00	104.77 101.97 96.70	7364 7233 6982	257 254 248	1715 1455 960	0.099 0.083 0.051	106 76 195
D	Cosmos 63	1965-20C	1965 Mar 15.46 964.48 days 1967 Nov [illegible].94	Ellipsoid? 50?	1.0 long? 0.8 dia?	1965 Mar 17.6 1966 Nov 2.6 1967 Oct 28.9	56.03 55.98 55.99	104.37 100.05 90.32	7345 7142 6672	262 257 234	1672 1270 354	0.096 0.071 0.009	106 99 114
D	Cosmos 61 rocket	1965-20P	1965 Mar 15.46 1705 days 1969 Nov 14	Cylinder* 2200?	7.4 long* 2.4 dia	1965 May 23.5 1968 Jan 31.6 1968 Aug 21.5	56.12 56.05 56.05	105.99 101.33 98.95	7421 7203 7089	295 277 268	1791 1372 1154	0.101 0.076 0.062	- 66 -
104d	Fragments	1965-20D-PJ											
	[Thor Altair]	1965-21A	1965 Mar 18.20 30 years	- 130?	-	1965 Mar 18.3 1968 Jan 16.4	99.12 99.04	97.68 97.45	7023 7014	525 524	764 748	0.017 0.016	301 290
	Altair rocket	1965-21C	1965 Mar 18.20 15 years	Cylinder 24	1.5 long 0.46 dia	1965 Sep 1.3 1970 Aug 1.0	99.01 98.99	97.67 96.58	7021 6968	523 503	762 676	0.017 0.012	125 -
3d	Fragments	1965-21B,D-F											
D 2M R	Voskhod 2	1965-22A	1965 Mar 18.29 1.09 days 1965 Mar 19.38	Sphere-cylinder 5632	6 long? 2.4 dia	1965 Mar 18.7	64.79	90.93	6699	167	475	0.023	70
D	Voskhod 2 rocket	1965-22B	1965 Mar 18.29 9.69 days 1965 Mar 27.98	Cylinder 2500?	7.5 long 2.6 dia	1965 Mar 20.2	64.77	90.57	6681	163	443	0.021	70
D	Fragments	1965-22C,D											
D 2M R	Gemini 3	1965-24A	1965 Mar 23.60 0.20 day 1965 Mar 23.80	Cone 3220 payload 2100	5.6 long 3.0 dia	1965 Mar 23.6	33.0	88.37	6578	160	240	0.006	-
D	Gemini 3 rocket	1965-24B	1965 Mar 23.60 0.9 day 1965 Mar 24.5	Cylinder 1900	6 long 3.0 dia	1965 Mar 23.7	32.62	87.9	6555	164	190	0.002	65

Space vehicle: Ranger 9, 1965-23A. Ranger 9 rocket, 1965-23B, is now in a heliocentric orbit. * Before explosion.

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Year of launch 1965 continued

	Name	Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D R	Cosmos 64 1965-25A	1965 Mar 25.42 7.92 days 1965 Apr 2.34	Sphere-cylinder 4750?	4.3 long 2.4 dia	1965 Mar 25.5	64.98	89.17	6612	201	267	0.005	15
D	Cosmos 64 rocket 1965-25B	1965 Mar 25.42 10.56 days 1965 Apr 4.98	Cylinder 1440	3.8 long 2.6 dia	1965 Mar 25.8	65.00	89.25	6617	219	259	0.003	46
D	Fragment 1965-25C											
D	[Thor Agena D] 1965-26A	1965 Mar 25.88 10.1 days 1965 Apr 5.0	Cylinder 1500?	8 long? 1.5 dia	1965 Mar 25.9	96.08	89.06	6604	186	265	0.006	153
D	Fragment 1965-26B											
	[Atlas Agena D] 1965-27A (Snapshot)	1965 Apr 3.89 5000 years	Cylinder 2000? payload 440	11.6 long 1.5 dia	1965 Apr 4.1	89.97	111.58	7676	1282	1313	0.002	246
	Secor 4 (EGRS 4) 1965-27B	1965 Apr 3.89 5000 years	rectangular box 18	0.4 x 0.3 x 0.2	1965 Apr 4.1	90.03	111.58	7676	1282	1313	0.002	223
	Fragments 1965-27C-E											

Year of launch 1965 continued

	Name	Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
	Intelsat 1A(F-1)*1965-28A (Early Bird)	1965 Apr 6.99 > million years	Cylinder 39	0.59 long 0.72 dia	1965 May 10.9 1977 May 13.0	0.13 10.43	1436.95 1436.57	42183 42174	35003 35777	36606 35815	0.019 0.0005	345 80
	Intelsat 1A rocket 1965-28B	1965 Apr 6.99 100000 years	Cylinder 24	1.5 long 0.46 dia	1965 Apr 15.5	18.1	672.5	25425	1454	36639	0.692	-
D R	Cosmos 65 1965-29A	1965 Apr 17.41 7.94 days 1965 Apr 25.35	Sphere-cylinder 5530?	5 long? 2.4 dia	1965 Apr 20.7	65.00	89.75	6641	207	319	0.008	54
D	Cosmos 65 rocket 1965-29B	1965 Apr 17.41 18.86 days 1965 May 6.27	Cylinder 2500?	7.5 long 2.6 dia	1965 Apr 21.6	65.04	89.87	6647	210	326	0.009	62
D	Fragment 1965-29C											
	Molniya 1A 1965-30A	1965 Apr 23.08 14 years	Cylinder + 6 vanes 1000?	3.4 long 1.6 dia	1965 Apr 25.1 1969 Sep 30.9	65.50 65.50	707.29 720.0	26297 26618	538 2303	39300 38177	0.737 0.674	324 -
D	Molniya 1A launcher rocket 1965-30C	1965 Apr 23.08 70.07 days 1965 Jul 2.15	Cylinder 2500?	7.5 long 2.6 dia	1965 Apr 29.1 1965 Jun 24.4	64.83 64.83	94.09 90.10	6855 6659	203 181	751 381	0.040 0.015	59 37
D	Molniya 1A launcher 1965-30B	1965 Apr 23.08 88 days 1965 Jul 20	Irregular	-	1965 Apr 25.8	64.83	94.52	6877	196	801	0.044	63
	Molniya 1A rocket 1965-30D	1965 Apr 23.08 14 years	Cylinder 440	2.0 long 2.0 dia	1966 Feb 17.2 1969 Sep 16.0 1974 Jul 1.0	65.56 65.77 65.8	702.50 702.59 702.59	26178 26180 26180	768 2149 1981	38831 37455 37623	0.727 0.674 0.681	319 - -

* International telecommunications satellite.

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Year of launch 1965 continued

	Name	Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D	[Atlas Agena D] 1965-31A	1965 Apr 28.84 5.14 days 1965 May 3.98	Cylinder 1500?	8 long? 1.5 dia	1965 May 1.3	95.60	88.95	6598	180	259	0.006	149
D	Capsule 1965-31B	1965 Apr 28.84 1646.28 days 1969 Oct 31.12	Octagon? 60?	0.3 long? 0.9 dia?	1965 Apr 29.1 1968 Jan 9.7 1968 Nov 30.5	95.26 95.17 95.13	95.16 94.30 93.34	6903 6864 6817	490 472 427	559 500 450	0.005 0.002 0.002	229 248 -
D	Fragments 1965-31C-C											
T L	Explorer 27 1965-32A (Beacon C)	1965 Apr 29.60 3000 years	Octagon + 4 Vanes 60	0.30 long 0.46 dia	1965 Apr 29.6	41.19	107.78	7507	941	1317	0.025	64
	Explorer 27 rocket 1965-32B Fragments 1965-32C, D	1965 Apr 29.60 500 years	Cylinder 24	1.5 long 0.46 dia	1965 May 1.1	41.16	107.71	7503	930	1320	0.026	72
D	[Thor Agena D] 1965-33A	1965 Apr 29.90 26.5 days 1965 May 26.4	Cylinder 1000?	8 long? 1.5 dia	1965 May 3.4	85.04	91.05	6704	178	473	0.022	147
D	Capsule 1965-33B	1965 Apr 29.90 39.43 days 1965 Jun 8.33	-	-	1965 May 19.0 1965 Jun 4.6	84.88 84.88	95.95 90.97	6997 6700	145 134	1092 509	0.068 0.028	135 55

	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
	Transtage 4 [Titan 3A]	1965-34A	1965 May 6.51 50000 years	Cylinder 3000	6 long 3 dia	1965 May 7.1	32.06	156.93	9642	2782	3746	0.050	293
	LES 2	1965-34B	1965 May 6.51 500000 years	Polyhedron 37	0.6 dia	1965 Jun 23.0 1968 Mar 9.0	32.10 32.20	309.85 309.62	15169 15166	2784 2782	14798 14794	0.396 0.396	327 114
	LCS 1*	1965-34C	1965 May 6.51 30000 years	Sphere 34	1.13 dia	1965 May 7.4	32.11	145.42	9165	2704	2869	0.009	267
	Fragment	1965-34D											
D R	Cosmos 66	1965-35A	1965 May 7.41 7.9 days 1965 May 15.3	Sphere-cylinder 4750?	4.3 long 2.4 dia	1965 May 7.8	65.01	89.33	6620	202	282	0.006	359
D	Cosmos 66 rocket	1965-35B	1965 May 7.41 16.47 days 1965 May 23.88	Cylinder 1440	3.8 long 2.6 dia	1965 May 7.8	65.02	89.50	6630	225	278	0.004	52
D	Fragments	1965-35C,D											
D	Luna 5 launcher	1965-36B	1965 May 9.33 1.2 days 1965 May 10.5	-	-	1965 May 9.7	64.78	88.25	6562	151	217	0.005	322
D	Luna 5 launcher rocket	1965-36C	1965 May 9.33 1.0 days 1965 May 10.3	Cylinder 2500?	7.5 long 2.6 dia	1965 May 9.7	64.75	88.24	6561	143	222	0.006	323

Space Vehicle: Luna 5, 1965-36A

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* Lincoln Calibration Satellite.

	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D	[Thor Agena D]	1965-37A	1965 May 18.75 28.24 days 1965 Jun 15.99	Cylinder 1500?	8 long? 1.5 dia	1965 May 25.3 1965 Jun 13.1	75.01 75.00	89.71 88.57	6643 6582	198 184	331 224	0.010 0.003	166 99
D	Fragment	1965-37B											
	[Thor Altair]	1965-38A	1965 May 20.69 30 years	- 130?	-	1965 May 23.8 1968 Jan 12.2	98.69 98.50	100.06 99.92	7138 7134	567 556	953 956	0.027 0.028	276 264
	Altair rocket	1965-38B	1965 May 20.69 25 years	Cylinder 24	1.5 long 0.46 dia	1965 Jun 12.8 1968 Jan 15.5	98.62 98.41	100.06 99.90	7139 7132	554 554	968 955	0.029 0.028	209 -
1d	Fragments	1965-38C-G											
	Pegasus 2 [Saturn SA8]	1965-39A	1965 May 25.32 20 years	Cylinder + wings 10,500	Wings 29.3 long 4.3 wide	1965 May 31.3 1970 Apr 16.0	31.73 31.75	96.99 96.01	6999 6952	502 488	740 660	0.017 0.012	141 -
	Apollo Model 4	1965-39B	1965 May 25.32 40 years	Cone-cylinder 4600	9 long 3.91 dia	1965 Jun 7.4 1967 Oct 5.2	31.74 31.78	97.04 96.95	7002 6997	512 507	736 731	0.016 0.016	254 336
D R	Cosmos 67	1965-40A	1965 May 25.45 7.99 days 1965 Jun 2.44	Sphere-cylinder 5530?	5 long? 2.4 dia	1965 May 27.5	51.81	89.89	6651	200	346	0.011	40
D	Cosmos 67 rocket	1965-40B	1965 May 25.45 10.0 days 1965 Jun 4.5	Cylinder 2500?	7.5 long 2.6 dia	1965 May 30.7	51.82	88.36	6621	190	296	0.008	39
D	Fragments	1965-40C,D											
D	[Atlas Agena D]	1965-41A	1965 May 27.81 5.11 days 1965 Jun 1.92	Cylinder 2000?	8 long? 1.5 dia	1965 May 29.0	95.78	88.67	6586	149	267	0.009	134

	Name	Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D	Explorer 28 1965-42A (Imp 3)	1965 May 29.50 1132.5 days 1968 Jul 5.0	Octagon + 4 vanes 59	0.2 long 0.71 dia	1965 May 29.52 1966 Aug 15.5 1967 Aug 3.0	34.0 50.08 53.61	8550 8423.2 8341.9	138473 137137 136251	190 26665 32290	264000 234852 227456	0.953 0.759 0.716	- - -
D	Explorer 28 1965-42B rocket	1965 May 29.50 37 months 1968 Jul	Cylinder 24	1.5 long 0.46 dia	Orbit similar to 1965-42A							
D 2M R	Gemini 4 1965-43A	1965 Jun 3.64 4.07 days 1965 Jun 7.71	Cone 3574	5.6 long 3.0 dia	1965 Jun 4.7	32.53	88.82	6600	162	281	0.009	74
D	Gemini 4 rocket 1965-43B	1965 Jun 3.64 2.09 days 1965 Jun 5.73	Cylinder 1900	6 long 3.0 dia	1965 Jun 3.9	32.58	88.59	6588	164	256	0.007	74
D	Luna 6 launcher 1965-44B	1965 Jun 8.32 4 days 1965 Jun 12	-	-	1965 Jun 9.4	64.76	88.65	6585	167	246	0.006	47
D	Luna 6 launcher rocket 1965-44C	1965 Jun 8.32 2.2 days 1965 Jun 10.5	Cylinder 2500?	7.5 long 2.6 dia	1965 Jun 8.7	64.70	88.52	6580	189	215	0.002	9
D	[Thor Agena D] 1965-45A	1965 Jun 9.92 12.58 days 1965 Jun 22.50	Cylinder 1500?	8 long? 1.5 dia	1965 Jun 18.4	75.07	89.84	6647	176	362	0.014	149
D	Fragment 1965-45B											

Luna 6, 1965-44A, was probably in a highly eccentric earth orbit initially, later a heliocentric orbit.

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	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D R	Cosmos 68	1965-46A	1965 Jun 15.42 7.90 days 1965 Jun 23.32	Sphere-cylinder 4750?	4.3 long 2.4 dia	1965 Jun 15.8	65.02	89.82	6640	209	315	0.008	30
D	Cosmos 68 rocket	1965-46B	1965 Jun 15.42 21.79 days 1965 Jul 7.21	Cylinder 1440	3.8 long 2.6 dia	1965 Jun 17.1	65.00	89.89	6646	215	321	0.008	57
D	Fragments	1965-46C-E											
D	[Titan 3C]	1965-47A	1965 Jun 18.58 11.2 days 1965 Jun 29.8	Cone 9700 lead ballast	5 long 3 dia	1965 Jun 19.5	32.14	88.02	6558	167	193	0.002	333
D	Transtage 5	1965-47B	1965 Jun 18.58 3.33 days 1965 Jun 21.91	Cylinder 1500	6 long 3 dia	1965 Jun 20.5	32.13	87.75	6546	163	176	0.001	313
	Transit 5B-6	1965-48A	1965 Jun 24.94 1000 years	Octagon + boom 61	0.5 long 0.46 dia	1965 Jun 25.3	90.00	106.92	7462	1024	1144	0.008	311
	[Thor Ablestar]	1965-48C	1965 Jun 24.94 1000 years	Cylinder?	1.45 long? 0.47 dia?	1965 Jun 28.0	90.00	106.94	7463	1025	1144	0.008	298
	Ablestar rocket	1965-48B	1965 Jun 24.94 1000 years	Cylinder 450?	4.8 long 1.4 dia	1965 Jun 30.3	90.00	106.65	7448	1034	1107	0.005	293
	Fragments	1965-48D-F											

	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D R	Cosmos 69	1965-49A	1965 Jun 25.41 7.91 days 1965 Jul 3.32	Sphere-cylinder 5530?	5 long? 2.4 dia	1965 Jun 27.5	64.89	89.65	6637	212	305	0.007	47
D	Cosmos 69 rocket	1965-49B	1965 Jun 25.41 11.5 days 1965 Jul 6.9	Cylinder 2500?	7.5 long 2.6 dia	1965 Jun 26.4	64.90	89.56	6631	193	312	0.009	36
D	Fragment	1965-49C											
D	Capsule	1965-50A	1965 Jun 25.81 1153 days 1968 Aug 22	Octagon 60?	0.3 long 0.9 dia	1965 Jun 27.0 1968 Jan 9.7 1968 Apr 30.5	107.65 107.63 107.57	94.68 93.22 92.20	6881 6811 6762	496 429 381	510 436 386	0.001 0.0005 0.0004	259 135 -
D	[Atlas Agena D]	1965-50B	1965 Jun 25.81 4.9 days 1965 Jun 30.7	Cylinder 1500?	8 long? 1.5 dia?	1965 Jun 26.8	107.64	88.78	6595	151	283	0.010	137
D	Fragments	1965-50C,D											
	Tiros 10	1965-51A	1965 Jul 2.17 80 years	Cylinder 127	0.56 long 1.07 dia	1965 Jul 2.3	98.65	100.76	7172	751	837	0.006	248
	Tiros 10 rocket	1965-51B	1965 Jul 2.17 80 years	Cylinder 24	1.5 long 0.46 dia	1965 Jul 5.7	98.64	100.71	7169	748	834	0.006	241
	Fragments	1965-51C, D											
D	Cosmos 70	1965-52A	1965 Jul 2.27 534.72 days 1966 Dec 18.99	Ellipsoid 400?	1.8 long 1.2 dia	1965 Jul 3.1 1965 Nov 1.9 1966 Nov 9.1	48.74 48.75 48.72	98.29 97.41 91.35	7059 7016 6723	215 223 204	1147 1052 486	0.066 0.059 0.021	109 256 110
D	Cosmos 70 rocket	1965-52B	1965 Jul 2.27 339.15 days 1966 Jun 6.42	Cylinder 1500?	8 long 1.65 dia	1965 Jul 5.5 1965 Oct 30.3 1966 May 23.4	48.75 48.79 48.71	98.24 96.80 90.85	7057 6987 6697	227 238 206	1130 979 433	0.064 0.053 0.017	120 250 90
D	Fragment	1965-52C											

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	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D	Cosmos 71	1965-53A	1965 Jul 16.15 1852 days 1970 Aug 11	Ellipsoid? 60?	1.0 long? 0.8 dia?	1965 Jul 18.6 1968 Jan 11.8 1969 Sep 16.0	56.04 56.07 56.00	95.23 94.70 93.45	6910 6884 6824	522 492 441	542 520 450	0.002 0.002 0.001	357 102 -
	Cosmos 72	1965-53B	1965 Jul 16.15 14 years	Ellipsoid? 60?	1.0 long? 0.8 dia?	1965 Jul 18.8 1972 Jan 1.0	56.06 56.06	95.87 94.72	6941 6885	538 494	588 520	0.004 0.002	357 -
D	Cosmos 73	1965-53C	1965 Jul 16.15 3169.36 days 1974 Mar 20.51	Ellipsoid? 60?	1.0 long? 0.8 dia?	1965 Jul 18.9 1969 Sep 16.0 1971 Nov 1.0	56.07 56.08 56.07	95.54 94.67 93.53	6925 6883 6828	538 498 446	556 511 453	0.001 0.001 0.001	356 - -
	Cosmos 74	1965-53D	1965 Jul 16.15 15 years	Ellipsoid? 60?	1.0 long? 0.8 dia?	1965 Jul 18.9 1970 Dec 1.0	56.04 56.05	96.16 95.28	6955 6913	538 508	616 561	0.006 0.004	356 -
	Cosmos 75	1965-53E	1965 Jul 16.15 14 years	Ellipsoid? 60?	1.0 long? 0.8 dia?	1965 Jul 28.8 1970 Sep 16.0	56.04 56.05	96.48 95.54	6970 6925	540 509	644 585	0.007 0.005	316 -
	Cosmos 71 rocket	1965-53F	1965 Jul 16.15 25 years	Cylinder 2200?	7.4 long 2.4 dia	1965 Jul 28.3 1977 Sep 1.0	56.08 56.08	96.54 95.60	6973 6928	544 515	646 585	0.007 0.005	318 -
D	Fragments	1965-53G-J											
D	Proton 1	1965-54A	1965 Jul 16.47 86.86 days 1965 Oct 11.33	Cylinder 12,200	3 long? 4 dia?	1965 Jul 17.8 1965 Oct 9.2	63.44 63.44	92.25 88.30	6764 6569	183 145	589 237	0.030 0.007	131 64
D	Proton 1 rocket	1965-54B	1965 Jul 16.47 63.9 days 1965 Sep 18.4	Cylinder 4000?	12 long? 4 dia	1965 Jul 20.4 1965 Sep 14.0	63.47 63.44	92.27 89.05	6769 6608	181 157	601 302	0.031 0.011	121 64
D	Fragments	1965-54C,D											

	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D	[Thor Agena D]	1965-55A	1965 Jul 17.25 1249.94 days 1968 Dec 18.19	Cylinder 1500?	8 long? 1.5 dia	1965 Jul 22.3 1968 Jan 14.4 1968 Jun 30.5	70.18 70.19 70.19	94.46 93.23 92.30	6870 6812 6769	471 417 380	512 451 401	0.003 0.002 0.002	85 182 -
D	Fragments	1965-55B-E											
D	Zond 3 launcher rocket	1965-56B	1965 Jul 18.61 1.4 days 1965 Jul 20.0	Cylinder 2500?	7.5 long 2.6 dia	1965 Jul 19.0	64.78	88.18	6565	164	210	0.004	189
D	Fragment *	1965-56C											
D	[Thor Agena D]	1965-57A	1965 Jul 19.92 29.25 days 1965 Aug 18.17	Cylinder 1500?	8 long? 1.5 dia	1965 Jul 21.0	85.05	91.01	6701	182	464	0.021	331
	Vela 5 [Atlas Agena D]	1965-58A	1965 Jul 20.35 > million years	Icosahedron 150	1.4 dia	1965 Jul 20.4 1969 Sep 16.0	35.27 32.3	5148.16 6709.8	98764 117843	88534 93297	96238 129632	0.039 0.154	220 -
	Vela 6	1965-58B	1965 Jul 20.35 > million years	Icosahedron 150	1.4 dia	1965 Jul 20.4 1969 Sep 16.0	34.99 31.4	6726.4 6718.3	118034 117942	101859 81949	121453 141179	0.083 0.251	218 -
D	ORS 3** (ERS 17)†	1965-58C	1965 Jul 20.35 3 years?	Octahedron 5.4	0.7 dia	1965 Jul 20.4 1965 Dec 31.5	34.39 36.88	2608.81 2595.4	62802 62558	153 566	112694 111793	0.896 0.889	219 -
D	Agena D rocket	1965-58D	1965 Jul 20.35 3 years?	Cylinder 700?	6 long? 1.5 dia	orbit similar to 1965-58C							
D	Cosmos 76	1965-59A	1965 Jul 23.19 236 days 1966 Mar 16	Ellipsoid 400?	1.8 long 1.2 dia	1965 Jul 24.1 1965 Nov 6.2 1966 Jan 14.5	48.78 48.78 48.80	92.17 91.49 90.65	6763 6730 6688	256 251 243	513 453 377	0.019 0.015 0.010	312 254 237
D	Cosmos 76 rocket	1965-59B	1965 Jul 23.19 134.3 days 1965 Dec 4.5	Cylinder 1500?	8 long 1.65 dia	1965 Jul 24.4 1965 Oct 31.3 1965 Dec 1.2	48.79 48.78 48.77	92.08 90.69 89.05	6760 6691 6606	253 246 201	510 330 254	0.019 0.010 0.004	310 231 22

* Zond 3 launcher, decayed 1965 Jul 21.

** Octahedron Research Satellite.

† Environment Research Satellite.

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Space vehicle: Zond 3, 1965-56A

	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D	Pegasus 3 [Saturn SA10]	1965-60A	1965 Jul 30.54 1465.76 days 1969 Aug 4.30	Cylinder + wings 10,500	wings 29.2 long 4.3 wide	1965 Jul 30.6 1968 Jan 14.4 1968 Oct 31.2	28.80 28.88 28.88	95.52 94.19 93.35	6929 6864 6823	535 479 441	567 493 449	0.002 0.001 0.001	322 238 -
D	Apollo Model 5	1965-60B	1965 Jul 30.54 3767 days	Cone-cylinder 2600?	9 long 3.91 dia	1965 Aug 3.1 1969 Sep 16.0	28.86 28.88	95.02 94.25	6905 6867	519 482	534 496	0.001 0.001	321 -
D	Fragment	1965-60C	1975 Nov 22			1971 Dec 1.0	28.87	93.36	6824	441	450	0.001	-
D R	Cosmos 77	1965-61A	1965 Aug 3.46 7.93 days 1965 Aug 11.39	Sphere-cylinder 5530?	5 long? 2.4 dia	1965 Aug 4.3	51.79	89.29	6619	201	280	0.006	123
D	Cosmos 77 rocket	1965-61B	1965 Aug 3.46 4.68 days 1965 Aug 8.14	Cylinder 2500?	7.5 long 2.6 dia	1965 Aug 4.3	51.81	89.03	6607	189	268	0.006	123
D	[Atlas Agena D]	1965-62A	1965 Aug 3.80 4.11 days 1965 Aug 7.91	- 500?	1.5 dia?	1965 Aug 4.0	107.47	89.06	6606	149	307	0.012	288
D	Capsule	1965-62B	1965 Aug 3.80 1048.31 days 1968 Jun 17.11	Octagon 60?	0.3 long? 0.9 dia?	1965 Aug 4.0 1968 Jan 10.0 1968 Mar 31.2	107.36 107.32 107.32	94.78 93.06 92.17	6886 6802 6759	501 421 376	515 427 385	0.001 0.0004 0.0006	288 268 -
D	Agena D rocket	1965-62C	1965 Aug 3.80 3 days 1965 Aug 6	Cylinder 700?	6 long? 1.5 dia	Orbit similar to 1965-62A							

Name	Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
Secor 5 rocket 1965-63A	1965 Aug 10.75 10000 years	Cylinder 24	1.49 long 0.50 dia	1965 Aug 18.0	69.26	122.26	8160	1137	2426	0.079	155
Secor 5 (EGRS 5) 1965-63B	1965 Aug 10.75 10000 years	Sphere 20	0.61 dia	1965 Dec 15.5	69.26	122.24	8160	1140	2423	0.079	-
Surveyor model 1 1965-64A	1965 Aug 11.60 Indefinite	Irregular 950	2.8 long 1.3 dia	1965 Aug 12	28.59	44640	417524	165	822,128	0.984	-
Centaur AC6 1965-64B	1965 Aug 11.60 Indefinite	Cylinder 1815	8.6 long 3.0 dia	orbit similar to 1965-64A							
Surcal [Thor Ablestar] 1965-65A	1965 Aug 13.32 1000 years	Sphere? + aerial?	60 metre aerial?	1965 Aug 16.9	90.02	108.19	7520	1074	1209	0.009	289
Ablestar rocket 1965-65B	1965 Aug 13.92 1000 years	Cylinder 450?	4.8 long 1.4 dia	1965 Aug 17.3	90.02	107.83	7503	1087	1162	0.005	297
Dodecapole 2 1965-65C	1965 Aug 13.92 100 years	Sphere + aerials 4	Sphere 0.3 dia	1965 Aug 18.0	90.03	108.14	7517	1094	1184	0.006	290
Tempsat 1 1965-65E	1965 Aug 13.92 1000 years	Sphere (black) 9	0.36 dia	1965 Aug 26.2	90.03	108.17	7519	1096	1186	0.006	262
Transit 5B-7 1965-65F	1965 Aug 13.92 1000 years	Octagon + boom 61	0.5 long 0.46 dia	1965 Aug 22.5	90.01	108.19	7520	1089	1194	0.007	276
Surcal 1965-65H	1965 Aug 13.92 200 years	Sphere (white) 2.2	0.36 dia	1965 Nov 15.5	90.05	108.19	7520	1082	1201	0.008	-
Surcal 1965-65K	1965 Aug 13.92 1000 years	Rectangular box 6	0.4 x 0.3 x 0.2?	1965 Aug 21.6	90.02	108.14	7517	1094	1184	0.006	269
Fragments 1965-65 D,G,J,L-3											

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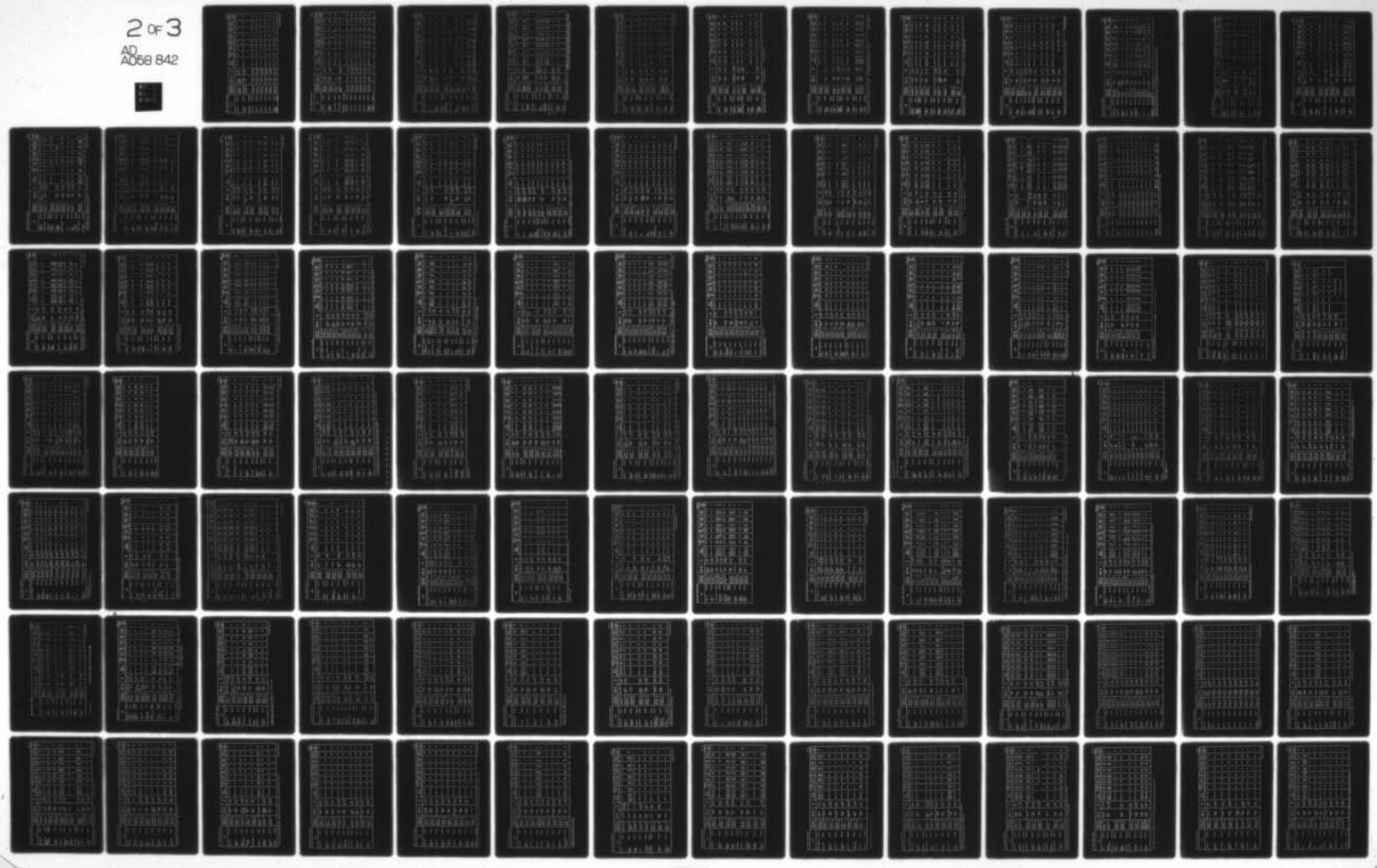
	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D R	Cosmos 78	1965-66A	1965 Aug 14.47 7.89 days 1965 Aug 22.36	Sphere-cylinder 4750?	4.3 long 2.4 dia	1965 Aug 14.8	68.92	89.75	6636	218	298	0.006	167
D	Cosmos 78 rocket	1965-66B	1965 Aug 14.47 20.3 days 1965 Sep 3.8	Cylinder 1440	3.8 long 2.6 dia	1965 Aug 16.5	68.98	89.76	6637	219	299	0.006	40
D	Fragment	1965-66C											
D	[Thor Agena D]	1965-67A	1965 Aug 17.87 54.40 days 1965 Oct 11.27	Cylinder 1500?	8 long? 1.5 dia	1965 Aug 19.9 1965 Oct 8.1	70.04 70.04	90.37 88.83	6672 6594	180 176	407 255	0.017 0.006	153 65
D 2 M R	Gemini 5	1965-68A	1965 Aug 21.58 7.96 days 1965 Aug 29.54	Cone 3605	5.6 long 3.0 dia	1965 Aug 24.5	32.61	89.38	6628	197	303	0.008	104
D	Gemini 5 rocket	1965-68B	1965 Aug 21.58 3.12 days 1965 Aug 24.70	Cylinder 1900	6 long 3.0 dia	1965 Aug 23.9	32.58	88.22	6576	152	244	0.007	103
D	REP*	1965-68C	1965 Aug 21.58 5.71 days 1965 Aug 27.29	Box 35	0.6 x 0.3 x 0.3	1965 Aug 23.2	32.58	89.18	6619	168	314	0.011	87
D	Fragment	1965-68D											

*Radar Evaluation Pod ejected from Gemini 5 about 1965 Aug 21.66.

AD-A058 842 ROYAL AIRCRAFT ESTABLISHMENT FARNBOROUGH (ENGLAND) F/G 22/2
REVISED TABLE OF EARTH SATELLITES. VOLUME 1. 1957 TO 1968.(U)
JAN 78 D G KING-HELE, H HILLER
UNCLASSIFIED RAE-TR-78012 DRIC-BR-63010 NL

2 OF 3
AD
A058 842



	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D R	Cosmos 79	1965-69A	1965 Aug 25.43 7.9 days 1965 Sep 2.3	Sphere-cylinder 5530?	5 long? 2.4 dia	1965 Aug 28.3	64.90	89.94	6650	205	338	0.010	54
D	Cosmos 79 rocket	1965-69B	1965 Aug 25.43 13.18 days 1965 Sep 7.61	Cylinder 2500?	7.5 long 2.6 dia	1965 Aug 30.8	64.90	89.64	6635	204	310	0.008	39
D	Fragments	1965-69C-E											
	Cosmos 80	1965-70A	1965 Sep 3.58 10000 years	Ellipsoid? 50?	1.0 long? 0.8 dia	1965 Sep 4.0	55.98	114.97	7834	1357	1555	0.013	107
	Cosmos 81	1965-70B	1965 Sep 3.58 10000 years	Ellipsoid? 50?	1.0 long? 0.8 dia?	1965 Sep 5.5	56.05	115.29	7849	1384	1557	0.011	116
	Cosmos 82	1965-70C	1965 Sep 3.58 10000 years	Ellipsoid? 50?	1.0 long? 0.8 dia?	1965 Sep 5.6	56.04	115.65	7865	1408	1565	0.010	126
	Cosmos 83	1965-70D	1965 Sep 3.58 10000 years	Ellipsoid? 50?	1.0 long? 0.8 dia?	1965 Sep 5.5	56.03	116.01	7882	1441	1567	0.008	138
	Cosmos 84	1965-70E	1965 Sep 3.58 10000 years	Ellipsoid? 50?	1.0 long? 0.8 dia?	1965 Sep 5.6	56.03	116.33	7899	1466	1576	0.007	208
	Cosmos 80 rocket	1965-70F	1965 Sep 3.58 10000 years	Cylinder 2200?	7.4 long 2.4 dia	1965 Sep 5.5	56.11	114.57	7815	1359	1515	0.010	208
	Fragment	1965-70G											

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	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D R	Cosmos 85	1965-71A	1965 Sep 9.40 7.89 days 1965 Sep 17.29	Sphere-cylinder 5530?	5 long? 2.4 dia	1965 Sep 9.8	64.90	89.53	6629	204	297	0.007	56
D	Cosmos 85 rocket	1965-71B	1965 Sep 9.40 9.0 days? 1965 Sep 18.4?	Cylinder 2500?	7.5 long 2.6 dia	1965 Sep 11.5	64.91	89.26	6617	199	279	0.006	42
	[Thor Altair]	1965-72A	1965 Sep 10.20 80 years	- 130?	-	1965 Sep 10.6	98.65	101.93	7230	649	1054	0.028	250
	Altair rocket	1965-72D	1965 Sep 10.20 50 years	Cylinder 24	1.49 long 0.50 dia	1966 Jan 15.5	98.64	101.94	7230	649	1055	0.028	-
2d	Fragments	1965-72B,C,E,F											
	Cosmos 86	1965-73A	1965 Sep 18.33 10000 years	Ellipsoid? 50?	1.0 long? 0.8 dia?	1965 Sep 20.3	56.06	115.02	7836	1277	1638	0.023	136
	Cosmos 87	1965-73B	1965 Sep 18.33 10000 years	Ellipsoid? 50?	1.0 long? 0.8 dia?	1965 Sep 22.6	56.06	115.42	7855	1304	1650	0.022	145
	Cosmos 88	1965-73C	1965 Sep 18.33 10000 years	Ellipsoid? 50?	1.0 long? 0.8 dia?	1965 Sep 20.3	56.05	115.81	7872	1321	1667	0.022	146
	Cosmos 89	1965-73D	1965 Sep 18.33 10000 years	Ellipsoid? 50?	1.0 long? 0.8 dia?	1965 Sep 19.8	56.09	116.17	7890	1346	1677	0.021	153
	Cosmos 90	1965-73E	1965 Sep 18.33 10000 years	Ellipsoid? 50?	1.0 long? 0.8 dia?	1965 Sep 20.0	56.06	116.60	7909	1373	1689	0.020	159
	Cosmos 86 rocket	1965-73F	1965 Sep 18.33 10000 years	Cylinder 2200?	7.4 long 2.4 dia	1965 Sep 20.3	56.03	116.75	7915	1379	1695	0.020	159
	Fragments	1965-73G-L											

	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D	[Thor Agena D]	1965-71A	1965 Sep 22.89 18 days 1965 Oct 11	Cylinder 1500?	8 long? 1.5 dia	1965 Sep 25.0	80.01	90.04	6656	191	364	0.013	160
D R	Cosmos 91	1965-75A	1965 Sep 23.38 7.91 days 1965 Oct 1.29	Sphere-cylinder 5530?	5 long? 2.4 dia	1965 Sep 24.9	64.98	89.76	6642	204	324	0.009	49
D	Cosmos 91 rocket	1965-75B	1965 Sep 23.38 10.89 days 1965 Oct 4.27	Cylinder 2500?	7.5 long 2.6 dia	1965 Sep 25.8	64.97	89.53	6629	204	297	0.007	34
D	Fragments	1965-75C-E											
D	Capsule [Atlas Agena D]	1965-76A	1965 Sep 30.81 4.70 days 1965 Oct 5.51	- 500?	1.5 dia?	1965 Oct 1.2	95.60	88.77	6589	158	264	0.008	151
D	Agena D rocket	1965-76B	1965 Sep 30.81 2 days 1965 Oct 3	Cylinder 700?	6 long? 1.5 dia	orbit similar to 1965-75A							
D	Luna 7 launcher	1965-77B	1965 Oct 4.33 0.6 day 1965 Oct 4.9	-	-	1965 Oct 4.4	64.75	88.62	6586	129	266	0.012	138
D	Luna 7 launcher rocket	1965-77C	1965 Oct 4.33 0.8 day 1965 Oct 5.1	Cylinder 2500?	7.5 long 2.6 dia	1965 Oct 4.7	64.76	88.44	6577	124	272	0.011	134
	OV1-2*	1965-78A	1965 Oct 5.38 100 years	Cylinder + hemisphere 88	1.40 long 0.69 dia	1965 Oct 6.1 1968 Feb 11.5	144.30 144.2	125.58 125.2	8311 8290	403 411	3462 3412	0.184 0.181	53 -
	OV1-2 rocket	1965-78B	1965 Oct 5.38 50 years	Cylinder 70?	2.05 long 0.72 dia	1965 Oct 31.5 1968 Feb 11.5	144.30 144.2	125.56 125.1	8309 8284	414 412	3448 3399	0.183 0.180	- -

Space Vehicle: 1965-77A, Luna 7. * Orbiting vehicle.

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	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D	[Thor Agena D]	1965-79A	1965 Oct 5.74 24.01 days 1965 Oct 29.75	Cylinder 1500?	8 long? 1.5 dia	1965 Oct 6.7	75.05	89.75	6641	203	323	0.009	142
D	Molniya 1B	1965-80A	1965 Oct 14.82 518 days 1967 Mar 17	Cylinder + 6 vanes 1000?	3.4 long 1.6 dia	1965 Oct 18.3 1966 Mar 15.8	65.19 64.91	718.84 716.37	26586 26524	481 342	39935 39950	0.742 0.747	285 -
D	Molniya 1B launcher	1965-80B	1965 Oct 14.82 24.38 days 1965 Nov 8.20	Irregular	-	1965 Oct 17.1	64.85	91.09	6707	199	458	0.019	60
D	Fragments**	1965-80C-E											
	OGO 2	1965-81A	1965 Oct 14.54 16 years	Box + booms 507	1.73 long 0.84 wide 0.84 high	1965 Oct 14.7 1970 Sep 1.0	87.43 87.3	104.41 102.36	7344 7249	415 409	1517 1333	0.075 0.064	171 -
	OGO 2 rocket	1965-81B	1965 Oct 14.54 27 years	Cylinder 700?	6 long 1.5 dia	1965 Oct 15.6 1971 Aug 1.0	87.37 87.3	104.38 102.34	7342 7248	406 412	1522 1328	0.076 0.063	169 -
D	Transtage 6 [Titan 3C]	1965-82A	1965 Oct 15.79 2476.77 days 1972 Jul 27.56	Cylinder* 1500?	6 long* 3 dia	1965 Oct 18.2 1968 Jan 25.2 1970 May 1.0	32.61 32.27 32 3	99.70 99.34 97.80	7127 7110 7037	706 703 633	792 761 685	0.006 0.004 0.004	286 - -
201d	Fragments	1965-82B-UJ											
D R B	Cosmos 92	1965-83A	1965 Oct 16.34 7.94 days 1965 Oct 24.28	Sphere-cylinder 5530?	5 long? 2.4 dia	1965 Oct 17.4	64.97	89.85	6646	201	334	0.010	56
D	Cosmos 92 rocket	1965-83B	1965 Oct 16.34 13 days 1965 Oct 29	Cylinder 2500?	7.5 long 2.6 dia	1965 Oct 16.8	64.98	89.74	6641	203	322	0.009	53
D	Fragment	1965-83C											

* Before explosion; carried OV2-1 and LCS 2. **1965-80E was Molniya 1B rocket, similar to 1965-30D; decayed 1967 Jan 18, life 460 days
1965-80C was Molniya 1B launcher rocket; decayed 1965 Oct 22, life 8 days.

	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D	Cosmos 93	1965-84A	1965 Oct 19.24 76.29 days 1966 Jan 3.53	Ellipsoid 400?	1.8 long 1.2 dia	1965 Oct 19.7	48.39	91.77	6743	216	513	0.022	97
D	Cosmos 93 rocket	1965-84B	1965 Oct 19.24 29 days 1965 Nov 17	Cylinder 1500?	8 long 1.65 dia	1965 Oct 19.8	48.35	91.60	6734	208	504	0.022	94
D	Fragments	1965-84C-E											
D R B	Cosmos 94	1965-85A	1965 Oct 28.35 7.93 days 1965 Nov 5.28	Sphere-cylinder 5530?	5 long? 2.4 dia	1965 Oct 28.8	64.96	89.23	6616	205	271	0.005	65
D	Cosmos 94 rocket	1965-85B	1965 Oct 28.35 6.57 days 1965 Nov 3.92	Cylinder 2500?	7.5 long 2.6 dia	1965 Oct 29.8	64.97	89.04	6607	202	255	0.004	41
D	[Thor Agena D]	1965-86A	1965 Oct 28.89 19.81 days 1965 Nov 17.70	Cylinder 1500?	8 long? 1.5 dia	1965 Oct 31.9	74.97	90.54	6691	176	430	0.019	167
D	Fragment	1965-86B											
D	Proton 2	1965-87A	1965 Nov 2.52 96.01 days 1966 Feb 6.53	Cylinder 12,200	3 long? 4 dia?	1965 Nov 5.9	63.45	92.52	6776	189	608	0.031	59
D	Proton 2 rocket	1965-87B	1965 Nov 2.52 62.67 days 1966 Jan 4.19	Cylinder 4000?	12 long? 4 dia	1965 Nov 5.8	63.46	92.54	6777	182	616	0.032	250
D	Fragments	1965-87C-E											

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	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D	Cosmos 95	1965-88A	1965 Nov 4.23 75.39 days 1966 Jan 18.62	Ellipsoid 400?	1.8 long 1.2 dia	1965 Nov 4.6 1966 Jan 9.5	48.40 48.39	91.78 89.39	6714 6624	211 186	521 309	0.023 0.009	106 77
D	Cosmos 95 rocket	1965-88B	1965 Nov 4.23 24.7 days 1965 Nov 28.9	Cylinder* 1500?	8 long* 1.65 dia	1965 Nov 5.4 1965 Nov 23.5	48.40 48.39	91.55 89.50	6731 6639	218 201	487 321	0.020 0.009	107 336
D	Fragments	1965-88C-Z											
L	Explorer 29 (Geos 1)**	1965-89A	1965 Nov 6.78 50000 years	Octahedron + Pyramid 175	0.81 high 1.22 wide	1965 Nov 6.9	59.38	120.30	8074	1115	2277	0.072	150
	Explorer 29 rocket	1965-89B	1965 Nov 6.78 10000 years	Cylinder 24	1.5 long 0.46 dia	1965 Nov 8.5	59.37	120.29	8073	1114	2276	0.072	151
	Fragments	1965-89C,D											
D	[Atlas Agena D]	1965-90A	1965 Nov 8.81 2.92 days 1965 Nov 11.73	Cylinder 2000?	8 long? 1.5 dia	1965 Nov 8.9	93.88	88.74	6589	145	277	0.010	135
D	Fragment	1965-90B											
D	Venus 2 launcher	1965-91B	1965 Nov 12.21 5 days 1965 Nov 17	-	-	1965 Nov 15.3	51.85	88.67	6588	203	216	0.001	48
D	Venus 2 launcher rocket	1965-91C	1965 Nov 12.21 13.0 days 1965 Nov 25.2	Cylinder 2500?	7.5 long 2.6 dia	1965 Nov 15.2	51.87	89.47	6628	217	283	0.005	95

Space Vehicle: Venus 2, 1965-91A. * Before disintegration. ** Geodetic satellite.

	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D	Venus 3 launcher	1965-92B	1965 Nov 16.18 10.19 days 1965 Nov 26.37	-	-	1965 Nov 17.5	51.85	89.54	6631	213	293	0.006	80
D	Venus 3 launcher rocket	1965-92C	1965 Nov 16.18 16.86 days 1965 Dec 3.04	Cylinder 2500?	7.5 long 2.6 dia	1965 Nov 24.4	51.85	89.34	6623	203	286	0.006	117
D	Fragment	1965-92E											
	Explorer 30 (IQSY)*	1965-93A	1965 Nov 19.20 200 years	Sphere 57	0.61 dia	1965 Nov 19.8	59.72	100.80	7176	704	891	0.013	153
	Explorer 30 rocket	1965-93B	1965 Nov 19.20 50 years	Cylinder 24	1.5 long 0.46 dia	1965 Nov 30.5	59.70	100.75	7173	706	884	0.012	-
	Fragments	1965-93C, D											
D	Cosmos 96**	1965-94A	1965 Nov 23.14 16.21 days 1965 Dec 9.35	Cylinder 6540? full	7 long? 2.0 max dia	1965 Dec 1.9	51.88	89.20	6614	209	262	0.004	111
D	Cosmos 96 rocket	1965-94B	1965 Nov 23.14 11.83 days 1965 Dec 4.97	Cylinder 2500?	7.5 long 2.6 dia	1965 Nov 28.7	51.85	89.24	6618	210	269	0.004	120
D	Fragments	1965-94C-H											
D	Cosmos 97	1965-95A	1965 Nov 26.51 482.1 days 1967 Apr 2.6	Polygonal ellipsoid 400?	1.8 long 1.2 to 1.5 dia	1965 Nov 27.6 1966 Nov 8.5 1967 Mar 31.9	48.42 48.41 48.34	108.83 99.92 89.00	7556 7135 6606	213 207 175	2144 1306 281	0.128 0.077 0.008	104 298 212
D	Cosmos 97 rocket	1965-95B	1965 Nov 26.51 451.54 days 1967 Feb 21.05	Cylinder 1500?	8 long 1.65 dia	1965 Nov 27.6 1966 Nov 8.7 1967 Feb 2.4	48.43 48.41 48.41	108.68 97.96 92.60	7546 7042 6784	211 206 182	2125 1121 630	0.127 0.065 0.033	104 326 354
D	Fragments	1965-95C, D											

*International Quiet Sun Year.

**Cosmos 96 may have been a Space Vehicle launcher.

Space Vehicle: Venus 3, 1965-92A, and rocket 1965-92D

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	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
	Asterix 1 * [Diamant]	1965-96A	1965 Nov 26.62 200 years	Double-cone 40	0.53 long 0.55 dia	1965 Nov 27.9	34.24	108.61	7545	527	1808	0.085	82
	Asterix 1 rocket	1965-96B	1965 Nov 26.62 100 years	Cylinder 68	2.1 long 0.65 dia	1965 Nov 29.4	34.21	108.61	7546	524	1812	0.085	92
1d	Fragments	1965-96C,D											
D R	Cosmos 98	1965-97A	1965 Nov 27.35 8.0 days 1965 Dec 5.3	Sphere-cylinder 4750?	4.3 long 2.4 dia	1965 Nov 28.5	65.03	92.07	6754	205	547	0.025	85
D	Cosmos 98 rocket	1965-97B	1965 Nov 27.35 56.79 days 1966 Jan 23.14	Cylinder 1440	3.8 long 2.6 dia	1965 Nov 28.4 1966 Jan 10.7	65.04 65.04	92.17 90.07	6760 6658	198 187	566 373	0.027 0.014	92 72
D	Fragment	1965-97C											
	Alouette 2	1965-98A	1965 Nov 29.20 350 years	Oblate spheroid 145	0.86 long 1.07 dia	1965 Nov 30.5	79.82	121.43	8124	505	2987	0.153	335
	Explorer 31 (DME A)**	1965-98B	1965 Nov 29.20 300 years	Octagonal Cylinder 100	0.63 long 0.76 dia	1965 Nov 30.5	79.82	121.39	8120	505	2978	0.152	335
	Alouette 2 rocket	1965-98C	1965 Nov 29.20 400 years	Cylinder 700?	6 long? 1.5 dia	1965 Nov 30.5	79.84	121.39	8120	505	2979	0.152	335
	Fragments	1965-98D-J											
D	Luna 8 launcher	1965-99B	1965 Dec 3.45 1.63 days 1965 Dec 5.08	-	-	1965 Dec 4.1	51.82	88.20	6567	169	209	0.003	239
D	Luna 8 launcher rocket	1965-99C	1965 Dec 3.45 3 days 1965 Dec 6	Cylinder 2500?	7.5 long 2.6 dia	1965 Dec 4.3	51.87	88.48	6579	181	221	0.003	167

Space Vehicle: Luna 8, 1965-99A

*First French satellite. **Direct Measurement Explorer.

	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D 2 M R	Gemini 7*	1965-100A	1965 Dec 4.81 13.78 days 1965 Dec 18.59	Cone 3663	5.6 long 3.0 dia	1965 Dec 5.5 1965 Dec 12.3	28.87 28.90	89.75 90.27	6646 6673	215 292	321 298	0.008 0.0005	94 177
D	Gemini 7 rocket	1965-100B	1965 Dec 4.81 2.34 days 1965 Dec 7.15	Cylinder 1900	6 long 3.0 dia	1965 Dec 5.9	28.89	89.20	6617	160	318	0.012	87
D	Gemini 7 adaptor module	1965-100C	1965 Dec 4.81 54.10 days 1966 Jan 27.91	Truncated cone 245 0?	2.3 long 3.0 dia	1965 Dec 31.5	28.90	89.97	6657	262	296	0.003	-
	France 1	1965-101A	1965 Dec 6.88 60 years	Polyhedron 60	1.32 long 0.69 dia	1965 Dec 9.6	75.87	99.94	7133	746	762	0.001	45
	France 1 rocket	1965-101B	1965 Dec 6.88 40 years	Cylinder 24	1.5 long 0.46 dia	1965 Dec 8.3	75.83	100.04	7139	747	775	0.002	111
	Fragments	1965-101C,D											
D	[Thor Agena D]	1965-102A	1965 Dec 9.88 16.78 days 1965 Dec 26.66	Cylinder 1500?	8 long? 1.5 dia	1965 Dec 10.6	80.04	90.72	6688	183	437	0.019	102
D	Fragment	1965-102B											
D R	Cosmos 99	1965-103A	1965 Dec 10.34 7.90 days 1965 Dec 18.24	Sphere-cylinder 4750?	4.3 long 2.4 dia	1965 Dec 10.8	64.99	89.61	6634	203	309	0.008	236
D	Cosmos 99 rocket	1965-103B	1965 Dec 10.34 18.65 days 1965 Dec 28.99	Cylinder 1440	3.8 long 2.6 dia	1965 Dec 10.8	65.02	89.71	6639	221	301	0.006	45
D 2 M R	Gemini 6*	1965-104A	1965 Dec 15.57 1.08 days 1965 Dec 16.65	Cone 3546	5.6 long 3.0 dia	1965 Dec 15.8	28.89	89.64	6643	258	271	0.001	97
D	Gemini 6 rocket	1965-104B	1965 Dec 15.57 1.30 days 1965 Dec 16.87	Cylinder 1900	6 long 3.0 dia	initial orbit similar to 1965-104A							

*Rendezvous between Gemini 6 and Gemini 7 on 1965 Dec 15.81. 1965-100A and 100C were joined until 1965 Dec 18.58.

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	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D	Pioneer 6 second stage	1965-105B	1965 Dec 16.31 995.04 days 1968 Sep 6.35	Cylinder 400?	4.9 long 1.43 dia	1966 Jan 2.9 1967 Oct 8.1 1968 Mar 15.8	30.18 30.17 30.17	100.15 96.10 93.94	7150 6956 6853	273 265 252	1271 891 697	0.070 0.045 0.032	288 329 -
	Cosmos 100	1965-106A	1965 Dec 17.10 60 years	Cylinder + 2 vanes 2000?	5 long? 1.5 dia?	1965 Dec 17.8	65.00	97.58	7022	630	658	0.002	254
	Cosmos 100 rocket	1965-106B	1965 Dec 17.10 40 years	Cylinder 1440	3.8 long 2.6 dia	1965 Dec 19.5	64.99	97.74	7029	566	735	0.012	180
D	Cosmos 101	1965-107A	1965 Dec 21.26 203 days 1966 Jul 12	Ellipsoid 400?	1.8 long 1.2 dia	1965 Dec 21.8 1966 Jun 30.0	48.78 48.77	92.36 89.50	6775 6629	254 211	539 291	0.021 0.006	104 308
D	Cosmos 101 rocket	1965-107B	1965 Dec 21.26 116.1 days 1966 Apr 16.4	Cylinder 1500?	8 long 1.65 dia	1965 Dec 23.2 1966 Apr 7.9	48.77 48.74	92.23 89.70	6767 6642	253 217	524 310	0.020 0.007	108 263
D	Transtage 7* [Titan 3C]	1965-108A	1965 Dec 21.65 3525 days 1975 Aug 17	Cylinder 2000?	10 long? 3 dia	1965 Dec 26.1 1967 Nov 20.9 1969 Sep 16.0	26.38 26.45 26.53	589.26 441.56 289.4	23293 19245 14492	167 165 184	33662 25568 16043	0.719 0.660 0.547	3 226 -
D	LES 4	1965-108B	1965 Dec 21.65 4241 days? 1977 Aug 1?	Cylinder 52	0.91 long 0.85 dia	1965 Dec 28.6 1966 May 15.5	26.60 26.50	589.24 578.0	23289 23090	189 216	33632 33208	0.718 0.714	5 -
D	Oscar 4	1965-108C	1965 Dec 21.65 3765 days? 1976 Apr 12?	Tetrahedron 15	0.48 side	1965 Dec 27.8 1966 May 15.5	26.80 26.73	587.49 579.4	23240 22923	162 161	33561 32929	0.719 0.715	5 -
D	LES 3	1965-108D	1965 Dec 21.65 836 days 1968 Apr 6	Polyhedron 16	0.6 dia	1966 Jan 19.9 1967 Oct 21.9	26.46 26.36	581.41 151.93	23064 10083	195 155	33177 7254	0.715 0.352	20 17
D	Fragments	1965-108E-K											

Space Vehicle: Pioneer 6, 1965-105A * Carried OV2-3.

Fragment 1965-108G, designated about 1970 Jul 16, was probably satellite LES 4 rediscovered (lost 1966 May)
Fragment 1965-108K, designated about 1972 Apr 15, was probably satellite Oscar 4 rediscovered (lost 1966 May)

	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
	Transit 10 [Scout]	1965-109A	1965 Dec 22.19 1000 years	Octagon + 4 vanes 60?	0.25 long 0.46 dia	1965 Dec 27.9	89.11	105.09	7376	909	1086	0.012	190
	Altair rocket	1965-109B	1965 Dec 22.19 1000 years	Cylinder 24	1.5 long 0.46 dia	1965 Dec 26.3	89.10	105.09	7375	916	1078	0.011	196
	Fragments	1965-109C-E											
D	[Thor Agena D]	1965-110A	1965 Dec 24.88 26.39 days 1966 Jan 20.47	Cylinder 1500?	8 long? 1.5 dia	1965 Dec 26.7	80.01	90.83	6630	178	446	0.020	157
D	Fragment	1965-110B											
D	Cosmos 102	1965-111A	1965 Dec 27.93 17.00 days 1966 Jan 13.93	Cylinder	10 long? 2 dia?	1965 Dec 28.7	64.97	89.20	6614	203	259	0.005	241
	Cosmos 103	1965-112A	1965 Dec 28.52 60 years	Cylinder + paddles 850?	2 long? 1 dia?	1965 Dec 29.9	56.07	96.95	6993	594	636	0.003	114
	Cosmos 103 rocket	1965-112B	1965 Dec 28.52 30 years	Cylinder 2200?	7.4 long 2.4 dia	1965 Dec 28.9	56.05	97.07	6999	593	649	0.004	136
12 d	Fragments	1965-112C-Q											

	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D R	Cosmos 104	1966-01A	1966 Jan 7.35 7.90 days 1966 Jan 15.25	Sphere-cylinder 4750?	4.3 long 2.4 dia	1966 Jan 8.1	65.00	90.22	6665	193	380	0.014	79
D	Cosmos 104 rocket	1966-01B	1966 Jan 7.35 17.37 days 1966 Jan 24.72	Cylinder 1440	3.8 long 2.6 dia	1966 Jan 8.7	65.03	90.27	6667	189	389	0.015	91
D	Fragment	1966-01C											
D	Capsule	1966-02A	1966 Jan 19.84 6.00 days 1966 Jan 25.84	Sphere?	-	1966 Jan 22.0	93.86	88.72	6588	150	269	0.009	138
D	[Atlas Agena D]	1966-02B	1966 Jan 19.84 3.88 days 1966 Jan 23.72	Cylinder 1500?	8 long? 1.5 dia	1966 Jan 21.2	93.89	88.51	6578	154	246	0.007	140
D R	Cosmos 105	1966-03A	1966 Jan 22.36 7.90 days 1966 Jan 30.26	Sphere-cylinder 4750?	4.3 long 2.4 dia	1966 Jan 23.7	65.01	89.64	6635	204	310	0.008	26
D	Cosmos 105 rocket	1966-03B	1966 Jan 22.36 19 days 1966 Feb 10	Cylinder 1440	3.8 long 2.6 dia	1966 Jan 24.8	65.03	89.72	6640	215	308	0.007	64
D	Fragment	1966-03C											
D	Cosmos 106	1966-04A	1966 Jan 25.52 293.32 days 1966 Nov 14.84	Ellipsoid 400?	1.8 long 1.2 dia	1966 Jan 29.5 1966 Jun 15.5 1966 Oct 28.7	48.39 48.38 48.38	92.82 91.99 89.95	6795 6754 6652	281 275 241	553 476 307	0.020 0.015 0.005	115 - 32
D	Cosmos 106 rocket	1966-04B	1966 Jan 25.52 172.46 days 1966 Jul 16.98	Cylinder 1500?	8 long 1.65 dia	1966 Jan 28.9 1966 Jul 2.7	48.40 48.37	92.76 89.96	6792 6653	285 235	543 315	0.019 0.006	126 167

	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
	Transit 11 [Scout]	1966-05A	1966 Jan 28.71 1000 years	Octagon + 4 vanes 60?	0.25 long 0.46 dia	1966 Jan 31.4	89.78	105.99	7417	861	1217	0.024	198
	Altair rocket	1966-05B	1966 Jan 28.71 500 years	Cylinder 24	1.5 long 0.46 dia	1966 Jan 30.7	89.69	105.99	7417	864	1213	0.024	201
	Fragments	1966-05C-G											
D	Luna 9 launcher	1966-06B	1966 Jan 31.49 1.82 days 1966 Feb 2.31	-	-	1966 Jan 31.7	51.85	88.30	6571	167	219	0.004	353
D	Luna 9 launcher rocket	1966-06C	1966 Jan 31.49 0.45 day 1966 Jan 31.94	Cylinder 2500?	7.5 long 2.6 dia	initial orbit similar to 1966-06B							
D	[Thor Agena D]	1966-07A	1966 Feb 2.90 24.67 days 1966 Feb 27.57	Cylinder 1500?	8 long? 1.5 dia	1966 Feb 3.8	75.05	90.64	6683	185	425	0.018	158
	Essa 1*	1966-08A	1966 Feb 3.32 70 years	Cylinder 138	0.56 long 1.07 dia	1966 Feb 3.9	97.91	100.35	7152	702	845	0.010	222
	Essa 1 rocket	1966-08B	1966 Feb 3.32 30 years	Cylinder 24	1.5 long 0.46 dia	1966 Feb 15.5	97.86	100.61	7165	703	370	0.012	-
	Fragments	1966-08C-E											
D	[Thor Agena D]	1966-09A	1966 Feb 9.84 1324.93 days 1969 Sep 26.77	Cylinder 1500?	8 long? 1.5 dia	1966 Feb 10.0 1968 Jan 9.0 1968 Nov 15.5	82.09 82.08 82.08	94.83 94.06 93.21	6888 6851 6809	508 471 429	512 474 433	0.0003 0.0002 0.0003	88 4 -
D	Fragments	1966-09B,C											

Space vehicle: Luna 9, 1966-06A; and a rocket, 1966-06D, in a highly eccentric orbit.

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* Environmental science and services administration.

	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D R	Cosmos 107	1966-10A	1966 Feb 10.37 7.90 days 1966 Feb 18.27	Sphere-cylinder 4750?	4.3 long 2.4 dia	1966 Feb 11.5	64.97	89.64	6635	204	310	0.008	25
D	Cosmos 107 rocket	1966-10B	1966 Feb 10.37 18.57 days 1966 Feb 28.94	Cylinder 1440	3.8 long 2.6 dia	1966 Feb 12.2	64.99	89.74	6640	222	302	0.006	60
D	Fragments	1966-10C,D											
D	Cosmos 108	1966-11A	1966 Feb 11.75 282.80 days 1966 Nov 21.55	Ellipsoid 400?	1.8 long 1.2 dia	1966 Feb 12.3 1966 Jun 30.5 1966 Nov 10.0	48.87 48.87 48.84	95.32 93.40 89.70	6915 6821 6639	219 215 188	855 670 334	0.046 0.033 0.011	109 - 279
D	Cosmos 108 rocket	1966-11B	1966 Feb 11.75 109.31 days 1966 Jun 1.06	Cylinder 1500?	8 long 1.65 dia	1966 Feb 13.0 1966 May 21.5	48.85 48.82	95.22 90.29	6911 6669	222 197	844 384	0.045 0.014	111 201
D	Fragment	1966-11C											
D	Capsule [Atlas Agena D]	1966-12A	1966 Feb 15.85 7.44 days 1966 Feb 23.29	- 340?	1.5 dia?	1966 Feb 16.0	96.54	89.00	6599	148	293	0.011	126
D	Bluebell 2 cylinder	1966-12B	1966 Feb 15.85 0.72 day 1966 Feb 16.57	Inflated cylinder 8.7	2.44 long 0.30 dia	1966 Feb 16.3	96.48	88.13	6562	115	253	0.011	135
D	Bluebell 2 sphere	1966-12C	1966 Feb 15.85 6 days 1966 Feb 22	Inflated sphere 4.1	0.30 dia	1966 Feb 16.5	96.50	88.65	6586	149	267	0.009	128
D	Agena D rocket	1966-12D	1966 Feb 15.85 3 days 1966 Feb 18	Cylinder 660	6 long? 1.5 dia	Orbit similar to 1966-12A							
D	Fragments	1966-12E-AR											

	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
	Diapason 1	1966-13A	1966 Feb 17.36 200 years	Cylinder 19	0.20 long 0.50 dia	1966 Feb 19.7	34.03	118.51	7997	499	2738	0.140	81
	Diapason 1 rocket	1966-13B	1966 Feb 17.36 100 years	Cylinder 68	2.1 long 0.65 dia	1966 Feb 18.2	34.04	118.59	8001	503	2743	0.140	73
SC	Fragments	1966-13C-M											
D R B	Cosmos 109	1966-14A	1966 Feb 19.37 7.91 days 1966 Feb 27.28	Sphere-cylinder 5530?	5 long? 2.4 dia	1966 Feb 19.8	64.94	89.48	6627	202	295	0.007	54
D	Cosmos 109 rocket	1966-14B	1966 Feb 19.37 7.70 days 1966 Feb 27.07	Cylinder 2500?	7.5 long 2.6 dia	1966 Feb 21.2	64.95	89.18	6613	202	268	0.005	31
D	Fragment	1966-14C											
D R B	Cosmos 110	1966-15A	1966 Feb 22.84 21.75 days 1966 Mar 16.59	Sphere-cylinder 5700	5.0 long 2.4 dia	1966 Feb 23.5	51.85	95.30	6914	190	862	0.050	70
D	Cosmos 110 rocket	1966-15B	1966 Feb 22.84 65.94 days 1966 Apr 29.78	Cylinder 2500?	7.5 long 2.6 dia	1966 Feb 23.3 1966 Apr 21.7	51.83 51.82	95.22 90.12	6910 6661	186 163	877 403	0.050 0.018	66 275
D	Fragments	1966-15C, D											
	Essa 2	1966-16A	1966 Feb 28.58 10000 years	Cylinder 132	0.56 long 1.07 dia	1966 Mar 3.9	101.00	113.57	7765	1356	1418	0.004	192
	Essa 2 rocket	1966-16B	1966 Feb 28.58 5000 years	Cylinder 24	1.5 long 0.46 dia	1966 Mar 15.5	100.98	113.58	7766	1356	1420	0.004	-
	Fragments	1966-16C-E											

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	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D	Cosmos 111*	1966-17A	1966 Mar 1.46 1.61 days 1966 Mar 3.07	Cylinder 6540? full	7 long? 2.0 max dia	1966 Mar 1.8	51.84	88.19	6566	182	134	0.001	25
D	Cosmos 111 rocket	1966-17B	1966 Mar 1.46 <0.5 day 1966 Mar 1	Cylinder 2500?	7.5 long 2.6 dia	1966 Mar 1.5	51.80	87.49	6531	102?	203?	0.007?	-
D	Fragment	1966-17C											
D	[Thor Agena D]	1966-18A	1966 Mar 9.92 19.83 days 1966 Mar 29.75	Cylinder 1500?	8 long? 1.5 dia	1966 Mar 11.7	75.03	90.59	6683	178	432	0.019	160
D	Fragment	1966-18B											
D	Target Agena B**	1966-19A	1966 Mar 16.63 548.21 days 1967 Sep 15.84	Cylinder 3175	7.9 long 1.5 dia	1966 Mar 16.7 1966 Mar 22.5 1967 Sep 12.9	28.88 28.86 28.88	90.20 92.47 88.50	6670 6792 6585	285 401 200	298 407 213	0.001 0.0004 0.001	254 322 180
D 2M R	Gemini 8**	1966-20A	1966 Mar 16.70 0.44 day 1966 Mar 17.14	Cone 3789	5.6 long 3.0 dia	1966 Mar 16.8 1966 Mar 17.0	28.91 28.88	88.60 90.20	6590 6670	159 285	265 298	0.008 0.001	120 254
D	Gemini 8 rocket	1966-20B	1966 Mar 16.70 1.22 days 1966 Mar 17.92	Cylinder 1900	6 long 3.0 dia	1966 Mar 17.3	28.89	88.06	6563	145	224	0.006	110
D	Gemini 8 adapter module	1966-20C	1966 Mar 16.70 33 days 1966 Apr 18	Truncated cone 2525?	2.3 long 3.0 dia	1966 Mar 31.5 1966 Apr 15.5	28.84 28.85	89.84 88.88	6652 6604	264 226	284 226	0.0015 0	- -

*Cosmos 111 may have been a Luna Probe launcher

**Gemini 8 and Agena 8 docked Mar 16.97; 1966-20A and 20C seperated Mar 17.13

	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D R	Cosmos 112*	1966-21A	1966 Mar 17.44 7.79 days 1966 Mar 25.23	Sphere-cylinder 4750?	4.3 long 2.4 dia	1966 Mar 17.8	72.07	92.09	6754	207	545	0.025	65
D	Cosmos 112 rocket	1966-21B	1966 Mar 17.44 61.06 days 1966 May 17.50	Cylinder 1440	3.8 long 2.6 dia	1966 Mar 18.4	72.08	92.22	6761	214	552	0.025	72
D	Fragments	1966-21C,D											
D	Capsule	1966-22A	1966 Mar 18.85 5 days 1966 Mar 24	-	-	1966 Mar 19.0	100.95	89.30	6613	162	308	0.011	141
D	[Atlas Agena D]	1966-22B	1966 Mar 18.85 4.92 days 1966 Mar 23.77	Cylinder 1500?	8 long? 1.5 dia	1966 Mar 20.2	101.01	88.87	6596	152	284	0.010	140
D R	Cosmos 113	1966-23A	1966 Mar 21.40 7.92 days 1966 Mar 29.32	Sphere-cylinder 5530?	5 long? 2.4 dia	1966 Mar 21.8	64.94	89.71	6638	207	313	0.008	57
D	Cosmos 113 rocket	1966-23B	1966 Mar 21.40 9 days 1966 Mar 30	Cylinder 2500?	7.5 long 2.6 dia	1966 Mar 21.8	64.98	89.65	6634	209	302	0.007	56
D	Fragment	1966-23C											
	Transit 12 [Scout]	1966-24A	1966 Mar 26.15 300 years	Octagon + 4 vanes 60?	0.25 long 0.46 dia	1966 Mar 29.0	89.73	105.37	7388	891	1128	0.016	152
	Altair rocket	1966-24B	1966 Mar 26.15 300 years	Cylinder 24	1.5 long 0.46 dia	1966 Apr 16.6	89.74	105.36	7387	891	1127	0.016	99
	Fragments	1966-24C, D											

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* First satellite launch from Plesetsk.

	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
	OV1-4	1966-25A	1966 Mar 30.39 500 years	Cylinder + hemisphere 87.6	1.40 long 0.69 dia	1966 Mar 31.3	144.53	103.85	7323	879	1011	0.009	73
	OV1-5	1966-25B	1966 Mar 30.39 1000 years	Cylinder + hemisphere 114.3	1.40 long 0.69 dia	1966 Mar 30.8	144.66	105.48	7400	996	1048	0.004	33
	OV1-5 rocket	1966-25C	1966 Mar 30.39 500 years	Cylinder 70?	2.05 long 0.72 dia	1966 Apr 15.5	144.67	105.50	7401	987	1059	0.005	-
	OV1-4 rocket	1966-25D	1966 Mar 30.39 200 years	Cylinder 70?	2.05 long 0.72 dia	1966 Aug 27	144.53	103.96	7327	889	1009	0.008	-
1d	Fragments	1966-25E-H											
	[Thor Altair]	1966-26A	1966 Mar 31.19 50 years	- 130?	-	1966 Apr 2.3	98.60	100.56	7162	634	933	0.021	262
	Altair rocket	1966-26B	1966 Mar 31.19 30 years	Cylinder 24	1.5 long 0.46 dia	1966 Apr 19.3	98.63	100.56	7162	634	933	0.021	215
1d	Fragments	1966-26C-F											
D	Luna 10 launcher	1966-27B	1966 Mar 31.45 3.72 days 1966 Apr 4.17	-	-	1966 Apr 1.8	51.80	88.52	6582	195	212	0.001	55
D	Luna 10 launcher rocket	1966-27C	1966 Mar 31.45 1.55 days 1966 Apr 2.00	Cylinder 2500?	7.5 long 2.6 dia	1966 Mar 31.7	51.82	88.28	6571	186	199	0.001	85
D R	Cosmos 114	1966-28A	1966 Apr 6.49 7.81 days 1966 Apr 14.30	Sphere-cylinder 5530?	5 long? 2.4 dia	1966 Apr 6.9	72.94	90.06	6655	210	343	0.010	65
D	Cosmos 114 rocket	1966-28B	1966 Apr 6.49 12 days 1966 Apr 18	Cylinder 2500?	7.5 long 2.6 dia	1966 Apr 8.2	72.90	89.85	6645	200	333	0.010	45
D	Fragments	1966-28C-E											

Space Vehicle: Luna 10, 1966-27A, and rocket 1966-27D. Two fragments, 1966-27E and F, are in highly eccentric orbits.

	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D	[Thor Agena D]	1966-29A	1966 Apr 7.92 18.43 days 1966 Apr 26.35	Cylinder 1500?	8 long? 1.5 long	1966 Apr 9.9	75.06	89.56	6631	193	312	0.009	166
D	Surveyor Model 2	1966-30A	1966 Apr 8.04 27.22 days 1966 May 5.26	Truncated cone 771	2.8 long 1.3 dia	1966 Apr 9.6	30.71	89.50	6633	175	334	0.012	258
D	Centaur 8	1966-30B	1966 Apr 8.04 9 days 1966 Apr 17	Cylinder 1815	8.6 long 3.0 dia	1966 Apr 10.0	30.74	89.39	6629	165	337	0.013	305
	OAO 1*	1966-31A	1966 Apr 8.82 500 years	Octagonal Cylinder 1769	3.05 long 2.15 dia	1966 Apr 10.0	35.03	100.71	7177	792	806	0.001	46
	OAO 1 rocket	1966-31B	1966 Apr 8.82 200 years	Cylinder 700?	6 long? 1.5 dia	1966 Apr 12.1	35.03	100.66	7174	789	803	0.001	131
	Fragment	1966-31C											
D	Capsule [Atlas Agena D]	1966-32A	1966 Apr 19.80 6 days 1966 Apr 26	- 500?	- 1.5 dia?	1966 Apr 20.0	116.95	89.94	6650	145	398	0.019	127
D	Agena D rocket	1966-32B	1966 Apr 19.80 2 days 1966 Apr 22	Cylinder 700?	6 long? 1.5 dia	1966 Apr 20.0	116.96	89.02	6604	139	312	0.013	-
D R	Cosmos 115	1966-33A	1966 Apr 20.45 7.93 days 1966 Apr 28.38	Sphere-cylinder 4750?	4.3 long 2.4 dia	1966 Apr 20.5	65.00	89.44	6626	201	294	0.007	9
D	Cosmos 115 rocket	1966-33B	1966 Apr 20.45 10 days 1966 Apr 30	Cylinder 1440	3.8 long 2.6 dia	1966 Apr 20.9	65.03	89.44	6625	214	280	0.005	17

* Orbiting Astronomical Observatory.

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	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
	OV3-1	1966-34A	1966 Apr 22.41 200 years	Octagon 69	0.74 long 0.74 dia	1966 Apr 24.3 1968 Feb 12.8	82.47 82.46	151.81 150.86	9424 9388	351 353	5741 5667	0.286 0.283	164 332
	OV3-1 rocket	1966-34B	1966 Apr 22.41 50 years	Cylinder 24	1.5 long 0.46 dia	1966 Oct 31.5 1976 Jul 21.7	82.46 82.44	151.39 142.62	9410 9040	356 346	5708 4978	0.284 0.256	- -
1d	Fragments	1966-34C-E											
D	Molniya 1C	1966-35A	1966 Apr 25.30 2604 days 1973 Jun 11	Cylinder + 6 vanes 1000?	3.4 long 1.6 dia	1966 Apr 25.4 1966 Apr 26.3 1969 Oct 1.0	64.89 65.04 65.09	91.18 710.41 705.5	6712 26377 26254	186 506 1742	482 39492 38010	0.022 0.739 0.691	74 284 -
D	Molniya 1C launcher rocket	1966-35C	1966 Apr 25.30 13.57 days 1966 May 8.87	Cylinder 2500?	7.5 long 2.6 dia	1966 Apr 28.4	64.90	90.85	6694	182	450	0.020	72
D	Molniya 1C launcher	1966-35B	1966 Apr 25.30 13.84 days 1966 May 9.14	-	-	1966 Apr 30.5	64.86	90.78	6691	176	449	0.020	-
D	Molniya 1C rocket	1966-35F	1966 Apr 25.30 2611.24 days	Cylinder 440	2.0 long 2.0 dia	1968 Jun 15.5 1969 Oct 16.3	65.15 65.02	702.75 702.71	26184 26183	1215 1747	38397 37863	0.710 0.690	- -
D	Fragments	1966-35D,E	1973 Jun 18.54			1971 Oct 1.0	65.02	702.77	26185	869	38744	0.723	-
D	Cosmos 116	1966-36A	1966 Apr 26.42 220.75 days 1966 Dec 3.17	Ellipsoid 400?	1.8 long 1.2 dia	1966 Apr 26.9 1966 Nov 6.9	48.42 48.35	92.01 90.12	6754 6662	288 250	464 317	0.013 0.005	111 7
D	Cosmos 116 rocket	1966-36B	1966 Apr 26.42 111.20 days 1966 Aug 15.62	Cylinder 1500?	8 long 1.65 dia	1966 Apr 28.2 1966 Aug 4.1	48.38 48.36	91.91 89.72	6748 6641	289 236	451 289	0.012 0.004	116 236
D R	Cosmos 117	1966-37A	1966 May 6.46 7.89 days 1966 May 14.35	Sphere-cylinder 4750?	4.3 long 2.4 dia	1966 May 6.9	64.93	89.55	6630	205	298	0.007	26
D	Cosmos 117 rocket	1966-37B	1966 May 6.46 14.6 days 1966 May 21.1	Cylinder 1440	3.8 long 2.6 dia	1966 May 7.4	64.96	89.69	6637	219	299	0.006	65
D	Fragments	1966-37C-E											

	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
	Cosmos 118	1966-38A	1966 May 11.59 60 years	Cylinder + 2 vanes 2000?	5 long? 1.5 dia?	1966 May 12.0	65.00	97.13	7000	587	657	0.005	248
	Cosmos 118 rocket	1966-38B	1966 May 11.59 50 years	Cylinder 1440	3.8 long 2.6 dia	1966 May 13.3	64.98	97.03	6995	560	673	0.008	328
D	Capsule [Atlas Agena D]	1966-39A	1966 May 14.77 6 days 1966 May 21	- 500?	- 1.5 dia?	1966 May 16.6	110.55	89.40	6624	133	358	0.017	120
D	Capsule	1966-39B	1966 May 14.77 1627.01 days 1970 Oct 27.78	Octagon 60?	0.3 long 0.9 dia	1966 May 16.4 1968 Jan 7.3 1969 Sep 16.0	109.94 109.94 109.94	95.39 94.87 93.73	6916 6892 6838	517 493 443	559 534 476	0.003 0.003 0.002	84 215 -
D	Agena D rocket	1966-39C	1966 May 14.77 2 days 1966 May 17	Cylinder 700?	6 long? 1.5 dia	1966 May 15.6	110.68	88.87	6594	150?	280?	0.01?	129
	Nimbus 2	1966-40A	1966 May 15.33 800 years	Conical skeleton + 2 paddles 414	3.00 long 1.45 dia	1966 May 16.0	100.35	108.15	7519	1103	1179	0.005	339
	Nimbus 2 rocket	1966-40B	1966 May 15.33 1000 years	Cylinder 700?	6 long 1.5 dia	1966 May 20.4	100.31	107.91	7508	1085	1175	0.006	323
	Transit 13 [Scout]	1966-41A	1966 May 19.10 200 years	Octagon + 4 vanes 60?	0.25 long 0.46 dia	1966 May 19.4	90.00	103.48	7300	863	980	0.008	239
	Altair rocket	1966-41B	1966 May 19.10 200 years	Cylinder 24	1.5 long 0.46 dia	1966 May 20.7	90.00	103.48	7300	863	980	0.008	234
	Fragments	1966-41C-?											

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	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D	[Thor Agena D]	1966-42A	1966 May 24.08 16 days 1966 Jun 9	Cylinder 1500?	8 long? 1.5 dia	1966 May 24.6	66.04	89.00	6603	179	271	0.007	77
D	Cosmos 119	1966-43A	1966 May 24.23 189.96 days 1966 Nov 30.19	Cone-cylinder 2000?	9 long? 1.65 dia	1966 May 25.2 1966 Nov 7.5	48.38 48.34	99.76 92.52	7128 6779	208 191	1292 611	0.076 0.031	106 115
	Explorer 32 (AE-B)*	1966-44A	1966 May 25.58 20 years	Sphere 225	0.89 dia	1966 May 27.3 1977 Jun 8.1	64.66 64.55	116.01 107.34	7881 7489	289 257	2716 1965	0.154 0.114	50 -
D	Explorer 32 rocket	1966-44B	1966 May 25.58 1120.51 days 1969 Jun 19.09	Cylinder 24	1.5 long 0.46 dia	1966 Jun 4.0 1968 Jan 15.5 1968 Sep 30.5	64.67 64.65 64.53	115.86 107.21 101.94	7873 7483 7232	281 250 247	2710 1960 1461	0.159 0.114 0.084	48 - -
D	Fragment	1966-44C											
D	ATDA**	1966-46A	1966 Jun 1.63 40.03 days 1966 Jul 11.66	Cylinder 794	3.7 long 1.5 dia	1966 Jun 2.4	28.87	90.24	6672	292	296	0.0003	104
D	Atlas rocket	1966-46B	1966 Jun 1.63 disintegrated 1966 Jun 22	Cylinder 3400	20 long 3.0 dia	1966 Jun 14.4	28.81	89.47	6633	248	261	0.001	28
D	Fragments	1966-46C-BF											
D R 2M	Gemini 9 †	1966-47A	1966 Jun 3.57 3.01 days 1966 Jun 6.58	Cone 3750	5.6 long 3.0 dia	1966 Jun 6.2	28.86	89.80	6649	270	272	0.0002	151
D	Gemini 9 rocket	1966-47B	1966 Jun 3.57 0.86 day 1966 Jun 4.43	Cylinder 1900	6 long 3.0 dia	1966 Jun 3.6	28.80	87.37	6526	133	162	0.002	-

Space Vehicles: Surveyor 1, 1966-45A; and Centaur 10, 1966-45B in highly eccentric orbit.

* Atmospheric Explorer B. ** Augmented Target Docking Adaptor. † Gemini 9 and ATDA rendezvous Jun 3.8.

	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D	[Atlas Agena D]	1966-48A	1966 Jun 3.81 6.17 days 1966 Jun 9.98	Cylinder 1500?	8 long? 1.5 dia	1966 Jun 4.6	87.01	88.87	6594	143	288	0.011	132
D	Capsule	1966-48B	1966 Jun 3.81 5.43 days 1966 Jun 9.24	-	-	1966 Jun 5.9	86.97	88.70	6587	136	281	0.011	125
	OGO 3	1966-49A	1966 Jun 7.12 15 years?	Box + booms 515	1.73 long 0.84 wide 0.84 high	1966 Jun 19.1 1969 Sep 16.0 1972 Mar 1.0	31.39 64.5 77.6	2915.0 2912.6 2911.5	67624 67559 67541	319 6593 19519	122173 115769 102806	0.903 0.808 0.617	314 - -
	OGO 3 rocket	1966-49B	1966 Jun 7.12 15 years?	Cylinder 700?	6 long 1.5 dia	orbit similar to 1966-49A							
D R	Cosmos 120	1966-50A	1966 Jun 8.46 7.94 days 1966 Jun 16.40	Sphere-cylinder 5530?	5 long? 2.4 dia	1966 Jun 8.8	51.80	89.37	6623	205	285	0.006	30
D	Cosmos 120 rocket	1966-50B	1966 Jun 8.46 4.38 days 1966 Jun 12.84	Cylinder 2500?	7.5 long 2.6 dia	1966 Jun 9.3	51.78	89.11	6612	194	273	0.006	24
D	Fragments	1966-50C, D											
D	[Atlas Agena D]	1966-51A	1966 Jun 9.84 176.80 days 1966 Dec 3.64	Cylinder 700	8 long? 1.5 dia	1966 Jun 14.2 1966 Nov 23.4	90.05 89.94	124.89 95.84	8273 6936	174 155	3616 960	0.208 0.058	157 73
D	Secor 6 (EGRS 6)	1966-51B	1966 Jun 9.84 391.7 days 1967 Jul 6.5	Rectangular box 17	0.33 x 0.28 x 0.23	1966 Jun 13.2 1966 Nov 24.5 1967 Jul 2.5	90.05 90.02 89.90	125.13 115.15 91.21	8286 7838 6710	168 167 144	3648 2753 520	0.210 0.165 0.028	159 132 174
D	ORS 2 (ERS 16)	1966-51C	1966 Jun 9.84 275.44 days 1967 Mar 12.28	Octahedron 5	0.23 side	1966 Jun 14.2 1966 Nov 24.0 1967 Mar 6.3	90.03 90.00 89.87	125.02 109.90 93.28	8279 7598 6811	179 164 147	3623 2276 719	0.208 0.139 0.042	157 117 150

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Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
OV3-4	1966-52A	1966 Jun 10.18 600 years	Octagonal cylinder 78.5	0.74 long 0.74 dia	1966 Jun 10.6	40.77	142.99	9057	641	4718	0.225	140
OV3-4 rocket	1966-52B	1966 Jun 10.18 300 years	Cylinder 24	1.5 long 0.46 dia	1966 Jun 30.5	40.79	143.19	9065	643	4730	0.225	-
Fragments	1966-52C,D											
GGTS 1*	1966-53A	1966 Jun 16.58 > million yr	Polyhedron (26 faces) 47	0.8 long 0.9 dia	1966 Jun 17.0	0.10	1334.2	40147	33648	33889	0.003	202
IDCSP 1-1**	1966-53B	1966 Jun 16.58 > million yr	Polyhedron (26 faces) 45	0.8 long 0.9 dia	1966 Jun 17.0	0.09	1334.7	40155	33656	33897	0.003	144
IDCSP 1-2	1966-53C	1966 Jun 16.58 > million yr	Polyhedron (26 faces) 45	0.8 long 0.9 dia	1966 Jun 17.0	0.08	1335.3	40167	33668	33909	0.003	175
IDCSP 1-3	1966-53D	1966 Jun 16.58 > million yr	Polyhedron (26 faces) 45	0.8 long 0.9 dia	1966 Jun 17.0	0.12	1336.6	40194	33695	33936	0.003	197
IDCSP 1-4	1966-53E	1966 Jun 16.58 > million yr	Polyhedron (26 faces) 45	0.8 long 0.9 dia	1966 Jun 17.0	0.18	1338.6	40235	33696	34018	0.004	180
IDCSP 1-5	1966-53F	1966 Jun 16.58 > million yr	Polyhedron (26 faces) 45	0.8 long 0.9 dia	1966 Jun 17.0	0.04	1340.8	40279	33699	34102	0.005	126
IDCSP 1-6	1966-53G	1966 Jun 16.58 > million yr	Polyhedron (26 faces) 45	0.8 long 0.9 dia	1966 Jun 17.0	0.06	1344.0	40342	33722	34206	0.006	167
IDCSP 1-7	1966-53H	1966 Jun 16.58 > million yr	Polyhedron (26 faces) 45	0.8 long 0.9 dia	1966 Jun 17.0	0.04	1347.6	40414	33712	34359	0.008	120
Transtage 8 [Titan 3C]	1966-53J	1966 Jun 16.58 > million yr	Cylinder 1500?	6 long? 3 dia	1966 Jun 16.6 1966 Jun 16.7 1966 Jun 17.0	28.6 26.4 0.09?	87.9 591.2? 1351.3?	6553 23348 40188?	168 190 33730?	182 33750 34470?	0.001 0.751 0.009?	- - 164?

*Gravity Gradient Test Satellite. ** Initial Defense Communication Satellite Programme.

	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D R	Cosmos 121	1966-54A	1966 Jun 17.46 7.60 days 1966 Jun 25.26	Sphere-cylinder 3530?	5 long? 2.4 dia	1966 Jun 17.7	72.83	89.86	6645	260	333	0.010	68
D	Cosmos 121 rocket	1966-54B	1966 Jun 17.46 9.05 days 1966 Jun 26.51	Cylinder 2500?	7.5 long 2.6 dia	1966 Jun 17.7	72.85	89.76	6640	252	322	0.009	60
D	Fragments	1966-54C-E											
D	[Thor Agena D]	1966-55A	1966 Jun 21.90 22 days 1966 Jul 14	Cylinder 1500?	8 long? 1.5 dia	1966 Jun 23.6	80.10	90.15	6659	194	367	0.013	169
D	Fragment	1966-55B											
	Pageos 1**	1966-56A	1966 Jun 24.01 50 years	Inflated sphere 55	30.48 dia	1966 Jun 24.9 1972 Feb 1.0	87.14 86.3	181.43 180.43	10617 10578	4207 3496	4271 4903	0.003 0.067	241 -
	Pageos 1 rocket	1966-56B	1966 Jun 24.01 100000 years	Cylinder 700?	6 long 1.5 dia	1966 Jun 25.5	86.99	181.23	10609	4209	4252	0.002	243
560	Fragments*	1966-560-CF											
	Cosmos 122	1966-57A	1966 Jun 25.43 50 years	Cylinder + 2 vanes 2000?	5 long? 1.5 dia?	1966 Jun 25.5 1968 Jan 26.9	65.14 64.98	97.12 96.99	6998 6993	583 569	657 643	0.005 0.004	352 339
	Cosmos 122 rocket	1966-57B	1966 Jun 25.43 40 years	Cylinder 1440	3.8 long 2.6 dia	1966 Jun 27.5 1968 Jan 19.5	64.98 65.00	97.11 96.97	6997 6991	549 522	689 704	0.010 0.013	218 335
	Explorer 33 (Imp 4)	1966-58A	1966 Jul 1.67 Indefinite?	Octagon + 4 vanes 57	1.12 long 0.71 dia	1966 Jul 8.0 1968 Feb 11.5 1971 Jul 1.0	29.0 40.9 24.35	2314? 25863.5 38732	268759 289701 379500	30532 85228 256580	494230 481417 480763	0.863 0.684 0.283	- - -
D	Explorer 33 second stage	1966-58B	1966 Jul 1.67 138 days 1966 Nov 17	Cylinder 350?	4.9 long 1.43 dia	1966 Jul 4.6 1966 Nov 15.5	26.79 28.78	101.41 90.60	7205 6688	181 175	1473 444	0.090 0.020	126 -
	Explorer 33 third stage	1966-58C	1966 Jul 1.67 Indefinite?	Cylinder 24	1.5 long 0.46 dia	Initial orbit similar to 1966-58A							
D	Fragments	1966-580, E											

* Pageos shed 27 fragments on 1975 Jul 12.77, and 44 more fragments on 1976 Jan 20.0.

** Passive geodetic satellite

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	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D	[Saturn 203] Apollo 3	1966-59A	1966 Jul 5.62 disintegrated 1966 Jul 5.85	Cylinder 26552	28.3 long 6.6 dia	1966 Jul 5.7	31.98	88.31	6576	183	212	0.002	6
D	Fragments	1966-59B-AL											
D	Proton 3	1966-60A	1966 Jul 6.54 72.20 days 1966 Sep 16.74	Cylinder 12200	3 long? 4 dia?	1966 Jul 14.4 1966 Sep 8.7	63.47 63.45	92.24 89.32	6763 6620	185 162	585 321	0.030 0.012	60 58
D	Proton 3 rocket	1966-60B	1966 Jul 6.54 46.33 days 1966 Aug 21.87	Cylinder 4000?	12 long? 4 dia	1966 Jul 13.8 1966 Aug 14.4	63.46 63.45	92.08 89.60	6756 6633	181 162	574 348	0.029 0.014	60 58
D	Fragments	1966-60C,D											
D	Cosmos 123	1966-61A	1966 Jul 8.23 155.68 days 1966 Dec 10.91	Ellipsoid 400?	1.8 long 1.2 dia	1966 Jul 12.3 1966 Nov 23.1	48.77 48.77	92.16 89.95	6762 6651	256 220	512 326	0.019 0.008	124 53
D	Cosmos 123 rocket	1966-61B	1966 Jul 8.23 85.83 days 1966 Oct 2.06	Cylinder 1500?	8 long 1.65 dia	1966 Jul 13.4 1966 Sep 24.8	48.82 48.81	92.02 89.74	6755 6641	255 216	499 309	0.018 0.007	127 130
D	Capsule [Atlas Agena D]	1966-62A	1966 Jul 12.75 7 days 1966 Jul 20	- 500?	- 1.5 dia?	1966 Jul 17.6	95.52	88.25	6565	137	236	0.008	122
D	Agena D rocket	1966-62B	1966 Jul 12.75 1 day 1966 Jul 14	Cylinder 700?	8 long? 1.5 dia	1966 Jul 13.0	95.54	88.00	6552	130	217	0.007	-
	OV1-8	1966-63A	1966 Jul 14.09 4192 days	Spherical skeleton 10.4	9.14 dia	1966 Jul 15.5 1969 Feb 22.5	144.27 144.1	105.12 102.96	7384 7284	998 861	1013 950	0.001 0.006	263 -
	OV1-8 rocket	1966-63C	1966 Jul 14.09 1000 years	Cylinder 70?	2.05 long 0.72 dia	1966 Jul 31.5	144.27	105.11	7383	995	1015	0.001	-
	Fragments	1966-63B,D,E											

	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D R	Cosmos 124	1966-64A	1966 Jul 14.44 7.95 days 1966 Jul 22.39	Sphere-cylinder 5530?	5 long? 2.4 dia	1966 Jul 16.7	51.78	89.41	6624	205	286	0.006	59
D	Cosmos 124 rocket	1966-64B	1966 Jul 14.44 5.11 days 1966 Jul 19.55	Cylinder 2500?	7.5 long 2.6 dia	1966 Jul 16.7	51.78	88.91	6601	169	277	0.008	37
D	Fragments	1966-64C-E											
D	Target Agena 10*	1966-65A	1966 Jul 18.86 163.93 days 1966 Dec 29.79	Cylinder 3175	7.9 long 1.5 dia	1966 Jul 18.9 1966 Jul 19.2 1966 Jul 20.0 1966 Nov 20.0	28.85 28.80 28.86 28.87	90.23 95.04 92.31 90.21	6671 6905 6774 6669	290 298 391 288	296 755 400 293	0.0004 0.033 0.0004 0.0004	97 137 - 325
D 2 M R	Gemini 10*	1966-66A	1966 Jul 18.93 2.95 days 1966 Jul 21.88	Cone 3750	5.6 long 3.0 dia	1966 Jul 18.9 1966 Jul 19.2 1966 Jul 20.0	28.85 28.80 28.86	88.64 95.04 92.31	6592 6905 6774	160 298 391	268 755 400	0.008 0.033 0.0004	- 137 -
D	Gemini 10 rocket	1966-66B	1966 Jul 18.93 1.07 days 1966 Jul 20.00	Cylinder 1900	6 long 3.0 dia	1966 Jul 19.6	28.86	87.75	6547	143	195	0.004	123
D	Gemini 10 Adaptor module	1966-66J	1966 Jul 18.93 183 days 1967 Jan 17	Truncated cone 2510?	2.3 long 3.0 dia	1966 Sep 7.8 1966 Oct 31.5 1966 Dec 19.5	28.86 28.87 28.87	92.07 91.71 90.60	6762 6744 6690	381 361 311	388 370 312	0.0004 0.0006 0	- - -
D	Fragments	1966-66C-H,K											
D	Cosmos 125	1966-67A	1966 Jul 20.38 13.23 days 1966 Aug 2.61	Cone-cylinder 4000?	10 long? 2 dia?	1966 Jul 21.2	65.00	89.12	6610	205	258	0.004	277

*Gemini 10 and Agena 10 docked Jul 19.14; rendezvous with Agena 8 on Jul 19.93.
1966-66J was joined to 1966-66A until Jul 21.87.

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	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D R	Cosmos 126	1966-68A	1966 Jul 28.45 8.94 days 1966 Aug 6.39	Sphere-cylinder 5530?	5 long? 2.4 dia	1966 Jul 28.8	51.79	89.99	6655	204	350	0.011	53
D	Cosmos 126 rocket	1966-68B	1966 Jul 28.45 13.19 days 1966 Aug 10.64	Cylinder 2500?	7.5 long 2.6 dia	1966 Jul 28.6	51.81	89.94	6652	201	347	0.011	49
D	Fragment	1966-68C											
D	[Titan 3B Agena D]	1966-69A	1966 Jul 29.78 7 days 1966 Aug 6	Cylinder 3000?	8 long? 1.5 dia	1966 Jul 31.1	94.12	88.58	6582	158	250	0.007	143
	OV3-3	1966-70A	1966 Aug 4.45 50 years	Octagon 75	0.74 long 0.74 dia	1966 Aug 4.6 1968 Jan 1.9	81.44 81.49	137.01 136.28	8804 8775	360 359	4492 4430	0.235 0.232	158 3
	OV3-3 rocket	1966-70B	1966 Aug 4.45 30 years	Cylinder 24	1.5 long 0.46 dia	1966 Aug 19.3 1972 Jan 1.0	81.49 81.4	136.98 130.32	8801 8509	363 357	4482 3905	0.234 0.208	141 -
1d	Fragments	1966-70C,D											
D R	Cosmos 127	1966-71A	1966 Aug 8.47 7.93 days 1966 Aug 16.40	Sphere-cylinder 5530?	5 long? 2.4 dia	1966 Aug 11.1	51.83	89.13	6612	201	267	0.005	46
D	Cosmos 127 rocket	1966-71B	1966 Aug 8.47 3.88 days 1966 Aug 12.35	Cylinder 2500?	7.5 long 2.6 dia	1966 Aug 9.8	51.82	88.90	6599	175	267	0.007	28
D	[Thorad* Agena D]	1966-72A	1966 Aug 9.88 32.20 days 1966 Sep 11.08	Cylinder 2000?	8 long? 1.5 dia	1966 Aug 15.1	100.12	89.35	6619	194	287	0.007	158

* Thorad: long-tank thrust-augmented Thor.

	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D P	Capsule [Atlas Agena D]	1966-74A	1966 Aug 16.77 7.5 days 1966 Aug 24.3	- 500?	1.5 dia?	1966 Aug 17.6	93.24	89.58	6630	146	358	0.016	150
D	Capsule	1966-74B	1966 Aug 16.77 1296.25 days 1970 Mar 5.02	Octagon 60?	0.3 long 0.9 dia	1966 Aug 18.3 1968 Feb 8.2 1969 Feb 15.3	93.17 93.15 93.15	94.99 94.33 93.47	6895 6864 6824	510 479 440	524 493 451	0.001 0.001 0.001	291 351 -
D	Agena D rocket	1966-74C	1966 Aug 16.77 1 day 1966 Aug 18	Cylinder 700?	6 long? 1.5 dia	1966 Aug 16.8	93.30	89.25	6613	144	325	0.014	-
D	Pioneer 7 second stage	1966-75B	1966 Aug 17.64 354.5 days 1967 Aug 7.1	Cylinder 400?	4.9 long 1.43 dia	1966 Aug 20.8 1966 Nov 15.5 1967 Aug 2.2	32.76 32.97 32.97	97.04 96.15 89.06	7001 6958 6612	252 249 134	994 911 274	0.053 0.048 0.006	185 - 307
D	Fragments	1966-75D,E											
	Transit 14 [Scout]	1966-76A	1966 Aug 18.10 1000 years	Octagon + 4 vanes 60?	0.25 long 0.46 dia	1966 Aug 19.0	88.86	106.85	7457	1056	1101	0.003	109
	Altair rocket	1966-76B	1966 Aug 18.10 500 years	Cylinder 24	1.5 long 0.46 dia	1966 Sep 8.0	88.85	106.85	7457	1049	1109	0.004	58
	Fragments	1966-76C-G											
	[Atlas Agena D]	1966-77A	1966 Aug 19.81 100 000 years	Cylinder 2000?	8 long? 1.5 dia	1966 Aug 20.1	90.07	167.59	10068	3680	3700	0.001	167
	Secor 7 (EGRS 7)	1966-77B	1966 Aug 19.81 100 000 years	Rectangular box 17	0.36 x 0.30 x 0.25	1966 Aug 19.9	90.11	167.59	10068	3680	3700	0.001	166
	ORS 1 (ERS 15)	1966-77C	1966 Aug 19.81 80 000 years	Octahedron 5	0.25 side	1966 Aug 19.9	90.11	167.56	10064	3670	3702	0.002	174

Space Vehicles: Lunar Orbiter 1, 1966-73A; and Agena D rocket 1966-73B in a highly eccentric orbit.
Pioneer 7, 1966-75A and Altair rocket 1966-75C.

Continued on Page 116

	Name	Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D	Luna 11 launcher 1966-78B	1966 Aug 24.34 1.40 days 1966 Aug 25.74	-	-	1966 Aug 25.1	51.86	88.12	6562	177	190	0.001	312
D	Luna 11 launcher rocket 1966-78C	1966 Aug 24.34 2.49 days 1966 Aug 26.83	Cylinder 2500?	7.5 long 2.6 dia	1966 Aug 25.1	51.84	88.39	6575	193	201	0.0006	87
D R	Cosmos 128 1966-79A	1966 Aug 27.41 7.87 days 1966 Sep 4.28	Sphere-cylinder 5530?	5 long? 2.4 dia	1966 Aug 28.3	64.99	89.81	6644	213	319	0.008	41
D	Cosmos 128 rocket 1966-79B	1966 Aug 27.41 11 days 1966 Sep 7	Cylinder 2500?	7.5 long 2.6 dia	1966 Aug 28.4	64.98	90.00	6654	209	342	0.010	52
D	Target Agena 11* 1966-80A	1966 Sep 12.55 108.76 days 1966 Dec 30.31	Cylinder 3175	7.9 long 1.5 dia	1966 Sep 12.6 1966 Sep 16.6	28.83 28.88	90.35 91.20	6676 6718	298 326	298 353	0 0.002	- 308
D 2I R	Gemini 11* 1966-81A	1966 Sep 12.61 2.97 days 1966 Sep 15.58	Cone 3830?	5.6 long 3.0 dia	1966 Sep 12.6 1966 Sep 14.3 1966 Sep 14.5	28.83 28.83 28.83	88.78 101.55 90.31	6599 7211 6673	161 298 281	280 1368 308	0.009 0.074 0.002	- - -
D	Gemini 11 rocket 1966-81B	1966 Sep 12.61 0.99 day 1966 Sep 13.60	Cylinder 1900	6 long 3.0 dia	1966 Sep 12.6	28.80	87.71	6545	144	190	0.003	-
D	Gemini 11 Adaptor module 1966-81C	1966 Sep 12.61 26 days 1966 Oct 8	Truncated cone 2535?	2.3 long 3.0 dia	1966 Sep 30.5	28.83	89.47	6633	254	255	0	-
D	Fragment 1966-81D											
	[Thor Burner 2] 1966-82A	1966 Sep 16.19 50 years	12-sided frustum 195	1.64 long 1.31 to 1.10 dia	1966 Sep 17.1	98.46	100.86	7176	705	891	0.013	290
	Burner 2 rocket 1966-82B	1966 Sep 16.19 50 years	Sphere-cone 66	1.32 long 0.94 dia	1966 Sep 16.8	98.47	100.88	7178	699	900	0.014	289

Space vehicle: Luna 11 1966-78A. *Gemini and Agena 11 initially docked Sep 12.68. 1966-81C was joined to 1966-81A until Sep 15.57.

	Name	Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D	Capsule 1966-83A [Atlas Agena D]	1966 Sep 16.75 6 days 1966 Sep 23	- 500?	1.5 dia?	1966 Sep 17.9	93.98	89.37	6619	148	333	0.014	141
D	Capsule 1966-83B	1966 Sep 16.75 600.29 days 1968 May 9.04	Octagon? 60?	0.3 long 0.9 dia	1966 Sep 17.3 1968 Jan 31.8 1968 Mar 15.8	94.06 93.98 93.98	94.25 92.38 91.74	6859 6767 6736	460 385 354	501 393 361	0.003 0.0006 0.0005	11 227 -
D	Agena D rocket 1966-83C	1966 Sep 16.75 1.27 days 1966 Sep 18.02	Cylinder 700?	6 long? 1.5 dia	1966 Sep 16.8	93.90	89.10	6605	132	322	0.014	-
D	Fragment 1966-83D											
D	[Thor Agena D] 1966-85A	1966 Sep 20.88 21.90 days 1966 Oct 12.78	Cylinder 1500?	8 long? 1.5 dia	1966 Sep 21.0	85.13	90.87	6693	188	442	0.019	163
D	Fragment 1966-85B											
D	[Titan 3B Agena D] 1966-86A	1966 Sep 28.80 9.06 days 1966 Oct 7.86	Cylinder 3000?	8 long? 1.5 dia	1966 Sep 30.0	93.98	89.01	6602	151	296	0.011	125
	Essa 3 1966-87A	1966 Oct 2.44 10000 years	Cylinder 145	0.56 long 1.07 dia	1966 Oct 3.2	101.06	114.60	7816	1383	1493	0.007	125
	Essa 3 rocket 1966-87B	1966 Oct 2.44 5000 years	Cylinder 24	1.5 long 0.46 dia	1966 Oct 13.5	101.04	114.60	7816	1383	1493	0.007	99
	Fragments 1966-87C-F											
D	Cosmos U 1 1966-88A	1966 Sep 17.94 54.45 days 1966 Nov 11.39	Cone-cylinder?	6 long? 1.5 dia?	1966 Sep 18.0 1966 Oct 5.6	49.63 49.60	96.08 94.42	6982 6872	163 136	1046 851	0.063 0.052	83 156
D	Cosmos U 1 rocket 1966-88B	1966 Sep 17.94 168 days 1967 Mar 4	Cylinder 1500?	8 long? 2.5 dia?	1966 Oct 16.3 1967 Feb 8.0	49.27 49.23	97.58 92.40	7023 6772	280 259	1010 529	0.052 0.020	221 -
D	Fragments 1966-88C-E											

Space Vehicle: Surveyor 2, 1966-84A, and Centaur 11, 1966-84B in highly eccentric Orbit.
Cosmos U 1 is an abbreviation for 'first unnumbered Cosmos'.

Continued on Page 118

	Name	Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
	[Atlas Agena D] 1966-89A	1966 Oct 5.92 100 000 years	Cylinder 2000?	8 long? 1.5 dia	1966 Oct 6.9	90.20	167.63	10070	3682	3702	0.001	190
	Secor 8 1966-89B (EGRS 8)	1966 Oct 5.92 100 000 years	Rectangular box 17	0.33 x 0.28 x 0.23	1966 Oct 6.0	90.19	167.63	10069	3676	3706	0.002	183
D	[Atlas Agena D] 1966-90A	1966 Oct 12.80 8.18 days 1966 Oct 20.98	-	-	1966 Oct 13.3	90.96	89.00	6599	155	287	0.010	173
D	[Atlas Agena D] 1966-90B	1966 Oct 12.80 8.46 days 1966 Oct 21.26	Cylinder 1500?	8 long? 1.5 dia	1966 Oct 17.2	90.88	88.99	6598	181	258	0.006	142
D	Fragments 1966-90C, D											
D R	Cosmos 129 1966-91A	1966 Oct 14.51 6.75 days 1966 Oct 21.26	Sphere- cylinder 4750?	4.3 long 2.4 dia	1966 Oct 14.7	64.65	89.45	6624	180	312	0.010	49
D	Cosmos 129 1966-91B rocket	1966 Oct 14.51 9 days 1966 Oct 23	Cylinder 1440	3.8 long 2.6 dia	1966 Oct 15.2	64.58	89.50	6628	217	283	0.005	85
D	Molniya 1D 1966-92A	1966 Oct 20.33 692.02 days 1968 Sep 11.35	Windmill 1000?	3.4 long 1.6 dia	1966 Oct 21.4 1968 Jan 4.4 1968 May 31.2	65.35 64.91 64.91	714.4 717.93 715.8	26473 26564 26508	505 396 236	39685 39976 40024	0.740 0.745 0.751	283 275 -
D	Molniya 1D 1966-92B launcher	1966 Oct 20.33 21.62 days 1966 Nov 10.95	-	-	1966 Oct 20.4	64.76	90.83	6694	189	443	0.019	57
D	Molniya 1D 1966-92C launcher rocket	1966 Oct 20.33 13.62 days 1966 Nov 2.95	Cylinder 2500?	7.5 long 2.6 dia	1966 Oct 21.3	64.82	90.73	6689	200	422	0.017	62
D	Molniya 1D 1966-92D rocket	1966 Oct 20.33 959.06 days 1969 Jun 5.39	Cylinder 440	2.0 long 2.0 dia	1968 May 15.8 1969 Feb 16.0	64.8 64.9	710.8 220.5	26384 12091	236 104	39776 11321	0.749 0.464	- -

	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D R	Cosmos 130	1966-93A	1966 Oct 20.37 7.91 days 1966 Oct 28.28	Sphere-cylinder 5530?	5 long? 2.4 dia	1966 Oct 23.2	64.95	89.71	6639	208	314	0.008	51
D	Cosmos 130 rocket	1966-93B	1966 Oct 20.37 9.27 days 1966 Oct 29.64	Cylinder 2500?	7.5 long 2.6 dia	1966 Oct 22.7	64.94	89.46	6627	206	292	0.007	42
D	Luna 12 launcher	1966-94B	1966 Oct 22.36 2.49 days 1966 Oct 24.85	-	-	1966 Oct 22.7	51.92	88.58	6584	199	212	0.001	81
D	Luna 12 launcher rocket	1966-94C	1966 Oct 22.36 1.07 days 1966 Oct 23.43	Cylinder 2500?	7.5 long 2.6 dia	1966 Oct 22.7	51.89	88.13	6563	174	195	0.002	309
D	Surveyor Model 3	1966-95A	1966 Oct 26.47 11.06 days 1966 Nov 6.53	Irregular 950	2.8 long 1.3 dia	1966 Nov 1.0	29.6	15933	209561	166	406200	0.969	-
	Intelsat 2A (F-1)	1966-96A	1966 Oct 26.96 million years	Cylinder 140	0.67 long 1.42 dia	*1966 Oct 27.0 1966 Nov 7.7	26.43 17.22	669.8 730.0	25351 26856	289 3424	37656 37531	0.737 0.635	178 181
D	Intelsat 2A second stage	1966-96B	1966 Oct 26.96 105 days 1967 Feb 9	Cylinder 400?	4.9 long 1.43 dia	1966 Oct 31.5	28.73	92.31	6773	244	545	0.022	-
D	OV3-2	1966-97A	1966 Oct 28.50 1796.79 days 1971 Sep 29.29	Octagon 82	0.74 long 0.74 dia	1966 Oct 29.8 1968 Jan 31.0 1969 Sep 16.0	81.97 81.98 81.98	104.24 102.21 98.95	7337 7242 7086	320 313 306	1597 1414 1109	0.087 0.076 0.057	164 296 -
D	OV3-2 rocket	1966-97B	1966 Oct 28.50 1188.21 days 1970 Jan 28.71	Cylinder 24	1.5 long 0.46 dia	1966 Nov 7.7 1968 Jan 15.5 1969 Jan 31.7	81.97 81.97 81.93	104.23 101.42 97.82	7336 7204 7031	319 318 303	1596 1335 1003	0.087 0.071 0.050	139 - -
D	Fragments	1966-97C, D											

Space Vehicle: Luna 12, 1966-94A. Centaur 9, 1966-95B, is in a highly eccentric orbit.

*Intelsat 2A third-stage rocket, 1966-96C, had an initial orbit similar to 1966-96A.

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Year of launch 1966 continued

	Name	Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D	[Atlas Agena D] 1966-98A	1966 Nov 2.85 7.2 days 1966 Nov 10.0	Cylinder 1500?	8 long? 1.5 dia	1966 Nov 3.6	30.96	89.20	6610	159	305	0.011	150
D	[Atlas Agena D] 1966-98B	1966 Nov 2.85 13.71 days 1966 Nov 16.56	-	-	1966 Nov 4.1	91.00	89.86	6644	208	324	0.009	119
D	OV4-3 1966-99A MOL canister* [Titan 3C]	1966 Nov 3.58 66.9 days 1967 Jan 9.5	Cylinder 9680	13.7 long 3.0 dia	1966 Nov 4.4	32.82	90.42	6680	298	305	0.0005	307
D	OV4-1R 1966-99B (receiver)	1966 Nov 3.58 62.56 days 1967 Jan 5.14	Domed cylinder 136	1.40 long 0.43 dia	1966 Nov 5.6	32.84	90.30	6673	291	298	0.0005	164
D	OV1-6 1966-99C	1966 Nov 3.58 57.71 days 1966 Dec 31.29	Cylinder + 2 hemispheres 202	1.73 long 0.69 dia	1966 Nov 4.6	32.84	90.27	6671	290	295	0.0004	276
D	OV4-1T 1966-99D (transmitter)	1966 Nov 3.58 68.6 days 1967 Jan 11.2	Domed cylinder 109	1.40 long 0.43 dia	1966 Nov 5.3	32.83	90.59	6686	294	321	0.002	348
D	Lunar-orbiter 2 1966-100B rocket	1966 Nov 6.97 8.90 days 1966 Nov 15.87	Cylinder 700	8 long 1.5 dia	1966 Nov 11.4	29.6	12819	181242	128	349600	0.964	-
D	Cosmos U2 1966-101A	1966 Nov 2.03 15 days 1966 Nov 17	Cone- cylinder	6 long? 1.5 dia?	1966 Nov 7.6	49.58	94.50	6876	140	855	0.052	106
D	Capsule 1966-101C	1966 Nov 2.03 185 days 1967 May 6	- 1000?	0.8 dia?	1966 Dec 28.9 1967 May 1.1	49.61 49.47	94.28 88.29	6865 6571	144 114	830 272	0.050 0.012	321 148
D	Fragments 1966-101B-AS											

Space Vehicle: Lunar Orbiter 2, 1966-100A.
*Manned orbital laboratory.

	Name	Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D	[Thor 1966-102A Agena D]	1966 Nov 8.83 20.6 days 1966 Nov 29.4	Cylinder 1500?	8 long? 1.5 dia	1966 Nov 9.7	100.09	89.42	6623	172	318	0.011	175
D	Target* 1966-103A Agena 12	1966 Nov 11.80 41 days 1966 Dec 23	Cylinder 3175	7.9 long 1.5 dia	1966 Nov 12.3 1966 Nov 21.6	28.78 28.85	89.93 89.70	6655 6643	243 248	310 281	0.005 0.002	45 303
D 2R	Gemini 12* 1966-104A	1966 Nov 11.87 3.93 days 1966 Nov 15.80	Cone 3765	5.6 long 3.0 dia	1966 Nov 12.3	28.78	89.93	6655	243	310	0.005	45
D	Gemini 12 1966-104B rocket	1966 Nov 11.87 0.93 day 1966 Nov 12.80	Cylinder 1900	6 long 3.0 dia	1966 Nov 12.0	28.91	88.74	6597	159	278	0.009	132
D	Gemini 12 1966-104G adapter module	1966 Nov 11.87 19.74 days 1966 Dec 1.61	Truncated cone 2510?	2.3 long 3.0 dia	1966 Nov 30.5	28.85	89.13	6616	238	238	0	-
D	Fragments 1966-104C-F,H-Q											
D R	Cosmos 131 1966-105A	1966 Nov 12.41 7.81 days 1966 Nov 20.22	Sphere- cylinder 5530?	5 long? 2.4 dia	1966 Nov 12.7	72.86	89.94	6649	204	337	0.010	51
D	Cosmos 131 1966-105B rocket	1966 Nov 12.41 10.19 days 1966 Nov 22.60	Cylinder 2500?	7.5 long 2.6 dia	1966 Nov 12.7	72.85	89.80	6644	206	326	0.009	50
D R	Cosmos 132 1966-106A	1966 Nov 19.34 8.0 days 1966 Nov 27.3	Sphere- cylinder 4750?	4.3 long 2.4 dia	1966 Nov 19.4	65.02	89.37	6621	210	276	0.005	19
D	Cosmos 132 1966-106B rocket	1966 Nov 19.34 8.61 days 1966 Nov 27.95	Cylinder 1440	3.8 long 2.6 dia	1966 Nov 19.7	65.01	89.37	6621	223	263	0.003	66

*Gemini 12 and Agena 12 initially docked Nov 12.03. 1966-104G was joined to 1966-104A until Nov 15.79.

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	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D R	Cosmos 133	1966-107A	1966 Nov 28.46 2.0 days 1966 Nov 30.5	Sphere-cylinder + 2 wings 6450?	7.5 long 2.2 dia	1966 Nov 29.0	51.82	88.40	6575	171	223	0.004	323
D	Cosmos 133 rocket	1966-107B	1966 Nov 28.46 1.50 days 1966 Nov 29.96	Cylinder 2500?	7.5 long 2.6 dia	1966 Nov 29.0	51.82	88.22	6567	169	209	0.003	279
D R	Cosmos 134	1966-108A	1966 Dec 3.34 7.90 days 1966 Dec 11.24	Sphere-cylinder 5530?	5 long? 2.4 dia	1966 Dec 3.4	64.98	89.46	6626	201	294	0.007	52
D	Cosmos 134 rocket	1966-108B	1966 Dec 3.34 7.10 days 1966 Dec 10.44	Cylinder 2500?	7.5 long 2.6 dia	1966 Dec 4.1	64.97	89.39	6623	205	285	0.006	43
D	Fragment	1966-108C											
D	[Atlas Agena D]	1966-109A	1966 Dec 5.88 8.2 days 1966 Dec 14.1	- 500?	1.5 dia?	1966 Dec 6.9	104.63	89.77	6640	137	388	0.019	132
D	Agena D rocket	1966-109B	1966 Dec 5.88 3 days 1966 Dec 8	Cylinder 700?	8 long? 1.5 dia	1966 Dec 5.9	104.65	89.38	6621	121	364	0.018	-
T	ATS 1*	1966-110A	1966 Dec 7.09 > million years	Cylinder 352	1.45 long 1.42 dia	1966 Dec 7.8 1967 Feb 10	0.23 0.1	1465.89 1436.1	42748 42166	35852 35782	36887 35793	0.012 0.0001	129 -
D	ATS 1 rocket [Atlas Agena D]	1966-110B	1966 Dec 7.09 2869.36 days 1974 Oct 15.45	Cylinder 700?	6 long? 1.5 dia	1966 Dec 13.1 1969 Sep 16.0 1972 May 1.0	31.37 30.9 30.88	647.15 365.5 227.5	24733 16934 12346	167 170 178	36543 20941 11758	0.735 0.613 0.469	183 - -

* Applications Technology Satellite.

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Argument of perigee (deg)
117
125
180
-
-
285
-
-
55
62
-
-

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Year of launch 1966 continued

	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
	OV1-9	1966-111A	1966 Dec 11.88 200 years	Cylinder + hemisphere 104	1.40 long 0.69 dia	1966 Dec 12.6	99.14	142.30	9027	473	4824	0.241	147
	OV1-10	1966-111B	1966 Dec 11.88 40 years	Cylinder + hemispheres + 6 booms 130	1.40 long 0.69 dia	1966 Dec 12.5	93.43	98.87	7063	641	769	0.009	209
	OV1-10 rocket	1966-111C	1966 Dec 11.88 60 years	Cylinder 70?	2.05 long 0.72 dia	1966 Dec 30.4	93.42	98.85	7062	640	768	0.009	149
	OV1-9 rocket	1966-111D	1966 Dec 11.88 150 years	Cylinder 70?	2.05 long 0.72 dia	1966 Dec 21.3	99.13	142.30	9027	473	4824	0.241	135
D	Cosmos 135	1966-112A	1966 Dec 12.86 120.7 days 1967 Apr 12.6	Ellipsoid 400?	1.8 long 1.2 dia	1966 Dec 12.9 1967 Apr 7.8	48.44 48.41	93.58 89.39	6829 6624	253 206	649 286	0.029 0.006	112 320
D	Cosmos 135 rocket	1966-112B	1966 Dec 12.86 92.17 days 1967 Mar 15.03	Cylinder 1500?	8 long 1.65 dia	1966 Dec 13.3 1967 Mar 11.0	48.45 48.42	93.37 89.39	6822 6624	253 206	635 286	0.028 0.006	114 195
D	Fragments	1966-112C-E											
D	[Titan 3B Agena D]	1966-113A	1966 Dec 14.76 9 days 1966 Dec 24	Cylinder 3000?	8 long 1.5 dia	1966 Dec 17.1	109.56	89.58	6631	138	368	0.017	129
D	Bios 1	1966-114A	1966 Dec 14.81	Blunt cone	1.2 long	1966 Dec 17.6	33.51	90.44	6680	295	309	0.001	352
B	Capsule*		62.35 days 1967 Feb 15.16	127	1.02 dia	1967 Feb 13.8	33.50	87.85	6553	168	181	0.001	153
D	Bios 1 rocket	1966-114B	1966 Dec 14.81 38.68 days 1967 Jan 22.49	Cylinder 400?	4.9 long 1.43 dia	1966 Dec 18.7	33.50	90.27	6673	281	308	0.002	9
D	Bios 1 Adapter	1966-114C	1966 Dec 14.81 26.55 days 1967 Jan 10.36	Cylinder 300	1.8 long 1.45 dia	1967 Jan 2.5	33.50	89.65	6642	250	277	0.002	164
D	Fragment	1966-114D											

*Before 1966 Dec 17.8, Bios 1 capsule was attached to Bios 1 adapter.

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	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D R	Cosmos 136	1966-115A	1966 Dec 19.50 7.75 days 1966 Dec 27.25	Sphere-cylinder 4750?	4.3 long 2.4 dia	1966 Dec 19.7	64.68	89.17	6612	188	280	0.007	33
D	Cosmos 136 rocket	1966-115B	1966 Dec 19.50 9.0 days 1966 Dec 28.5	Cylinder 1440	3.8 long 2.6 dia	1966 Dec 21.4	64.61	89.35	6620	209	275	0.005	74
D	Luna 13 launcher	1966-116B	1966 Dec 21.43 1.85 days 1966 Dec 23.28	-	-	1966 Dec 21.5	51.80	88.40	6575	171	223	0.004	340
D	Luna 13 launcher rocket	1966-116C	1966 Dec 21.43 1 day 1966 Dec 22	Cylinder 2500?	7.5 long 2.6 dia	1966 Dec 21.5	51.77	87.79	6546	135	201	0.005	276
D	Cosmos 137	1966-117A	1966 Dec 21.55 337.26 days 1967 Nov 23.81	Ellipsoid 400?	1.8 long 1.2 dia	1966 Dec 21.6 1967 Jun 30.5 1967 Nov 20.8	48.78 48.77 48.74	104.38 98.93 89.50	7347 7084 6630	219 213 172	1718 1199 331	0.102 0.070 0.012	106 - 29
D	Cosmos 137 rocket	1966-117B	1966 Dec 21.55 278.25 days 1967 Sep 25.80	Cylinder 1500?	8 long 1.65 dia	1966 Dec 29.4 1967 May 15.8 1967 Sep 22.4	48.72 48.80 48.75	104.08 98.81 89.80	7332 7078 6645	221 215 180	1687 1185 353	0.100 0.069 0.013	134 - 153
D	[Thor Agena D]	1966-118A	1966 Dec 29.50 828.02 days 1969 Apr 5.52	Cylinder 1500?	8 long? 1.5 dia	1966 Dec 29.6 1968 Jan 30.7 1968 Aug 31.2	75.03 75.03 75.03	94.41 93.66 92.91	6869 6831 6794	486 448 413	496 458 419	0.0007 0.0007 0.0004	88 157 -
D	Fragments	1966-118B,C											
2d	Fragments	1966-00A-D*											

Space Vehicle: 1966-116A, Luna 13.

*These unidentified fragments were discovered in orbit, and catalogued on 1966 Sep 24 (A-C) and 1966 Dec 25 (D).

	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
	Intelsat 2B (F-2)	1967-01A	1967 Jan 11.45 > million years	Cylinder 87	0.67 long 1.42 dia	1967 Jan 22.9 1977 May 13.0	2.14 6.62	1448.5 1437.31	42408 42198	35563 35758	36496 35883	0.011 0.001	26 3
D	Intelsat 2B second stage	1967-01B	1967 Jan 11.45 92 days 1967 Apr 13	Cylinder 400?	4.9 long 1.43 dia	1967 Feb 5.4 1967 Mar 8.0	28.75 28.74	91.95 91.04	6754 6710	241 232	511 432	0.020 0.015	58 -
	Intelsat 2B third stage	1967-01D	1967 Jan 11.45 25 years?	Cylinder 24	1.5 long 0.46 dia	1967 Jan 31.5	26.18	652.9	24927	288	36810	0.733	-
13d	Fragments	1967-01C,E-X											
D r?	[Thor Agena D]	1967-02A	1967 Jan 14.89 18.7 days 1967 Feb 2.6	Cylinder 1st 15 days 1500? then 700?	8 long? 1.5 dia	1967 Jan 15.6	80.07	90.13	6658	180	380	0.015	161
D	Fragment	1967-02B											
	IDCSP 2-1	1967-03A	1967 Jan 18.60 > million years	Polyhedron (26 faces) 45	0.8 long 0.9 dia	1967 Jan 28.7	0.07	1329.6	40055	33557	33800	0.003	352
	IDCSP 2-2	1967-03B	1967 Jan 18.60 > million years	Polyhedron (26 faces) 45	0.8 long 0.9 dia	1967 Jan 28.3	0.05	1330.0	40064	33526	33846	0.004	117
	IDCSP 2-3	1967-03C	1967 Jan 18.60 > million years	Polyhedron (26 faces) 45	0.8 long 0.9 dia	1967 Jan 28.3	0.06	1330.7	40077	33579	33819	0.003	95
	IDCSP 2-4	1967-03D	1967 Jan 18.60 > million years	Polyhedron (26 faces) 45	0.8 long 0.9 dia	1967 Jan 28.3	0.07	1332.1	40105	33606	33847	0.003	104
	IDCSP 2-5	1967-03E	1967 Jan 18.60 > million years	Polyhedron (26 faces) 45	0.8 long 0.9 dia	1967 Jan 28.3	0.03	1334.2	40147	33608	33929	0.004	89
	IDCSP 2-6	1967-03F	1967 Jan 18.60 > million years	Polyhedron (26 faces) 45	0.8 long 0.9 dia	1967 Jan 28.2	0.06	1336.5	40195	33656	33978	0.004	28

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	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
	IDCSP 2-7	1967-03G	1967 Jan 18.60 > million years	Polyhedron (26 faces) 45	0.8 long 0.9 dia	1967 Jan 28.2	0.03	1339.5	40254	33675	34077	0.005	16
	IDCSP 2-8	1967-03H	1967 Jan 18.60 > million years	Polyhedron (26 faces) 45	0.8 long 0.9 dia	1967 Jan 28.2	0.05	1343.0	40325	33665	34229	0.007	32
	Transtage 9 [Titan 3C]	1967-03J	1967 Jan 18.60 > million years	Cylinder 1500?	6 long? 3 dia	1967 Jan 18.6 1967 Jan 28.2	28 0.1?	87.88 1347.6?	6554 40414?	170 33712?	182 34359?	0.001 0.008	- -
D R	Cosmos 138	1967-04A	1967 Jan 19.53 7.73 days 1967 Jan 27.26	Sphere-cylinder 4750?	4.3 long 2.4 dia	1967 Jan 23.3	64.55	89.15	6610	191	273	0.006	27
D	Cosmos 138 rocket	1967-04B	1967 Jan 19.53 8.5 days 1967 Jan 28.0	Cylinder 1440	3.8 long 2.6 dia	1967 Jan 26.6	64.57	88.31	6570	183	201	0.001	74
D R?	Cosmos 139	1967-05A	1967 Jan 25.58 0.06 day 1967 Jan 25.64	Cylinder?	2 long? 1 dia?	1967 Jan 25.6	49.7	87.97	6555	144	210	0.005	-
D	Cosmos 139 rocket	1967-05B	1967 Jan 25.58 0.3 day? 1967 Jan 25.9?	Cylinder 1500?	8 long? 2.5 dia ?			orbit similar to 1967-05A					
D	Cosmos 139 launch platform	1967-05C	1967 Jan 25.58 0.4 day? 1967 Jan 25	Irregular	-			orbit similar to 1967-05A					

	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
	Essa 4	1967-06A	1967 Jan 26.73 10000 years	Cylinder 132	0.56 long 1.07 dia	1967 Jan 29.4	102.00	113.48	7764	1328	1443	0.007	55
	Essa 4 rocket	1967-06B	1967 Jan 26.73 5000 years	Cylinder 24	1.5 long 0.46 dia	1967 Jan 27.4	101.98	113.68	7773	1344	1444	0.006	69
	Fragments	1967-06C-E											
D	[Atlas Agena D]	1967-07A	1967 Feb 2.83 9 days 1967 Feb 12	- 500?	1.5 dia?	1967 Feb 6.0	102.96	89.47	6625	136	357	0.017	123
D	Agena D rocket	1967-07B	1967 Feb 2.83 1.5 days 1967 Feb 4.3	Cylinder 700?	8 long? 1.5 dia?	1967 Feb 3	103.13	89.75	6639	176	345	0.013	-
D R	Cosmos 140	1967-09A	1967 Feb 7.14 1.99 days 1967 Feb 9.13	Sphere-cylinder + 2 wings 6450?	7.5 long 2.2 dia	1967 Feb 8.4	51.66	88.27	6570	165	218	0.004	335
D P	Cosmos 140 rocket	1967-09B	1967 Feb 7.14 1 day 1967 Feb 8	Cylinder 2500?	7.5 long 2.6 dia	1967 Feb 8.0	51.72	87.79	6546	148	187	0.003	329
	[Thor Burner 2]	1967-10A	1967 Feb 8.33 70 years	12-sided frustum 193	1.64 long 1.31 to 1.10 dia	1967 Feb 8.5	98.84	101.55	7210	796	868	0.005	45
	Burner 2 rocket	1967-10B	1967 Feb 8.33 50 years	Sphere-cone 66	1.32 long 0.94 dia	1967 May 24.1	98.83	101.53	7209	790	871	0.006	98
L	Diademe 1	1967-11A	1967 Feb 8.40 50 years	Cylinder + 4 vanes 22.7	0.20 long 0.5 dia	1967 Feb 28.5 1973 Feb 1.0	39.98 39.98	104.17 103.7	7338 7315	569 561	1350 1312	0.053 0.051	- -
	Diademe 1 rocket	1967-11B	1967 Feb 8.40 100 years	Cylinder 68	2.1 long 0.65 dia	1967 Mar 6.0	39.92	103.97	7328	574	1325	0.051	-
6d	Fragments	1967-11C-Q											

	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D R	Cosmos 141	1967-12A	1967 Feb 8.43 7.79 days 1967 Feb 16.22	Sphere-cylinder 5530?	5 long? 2.4 dia	1967 Feb 13.4	72.85	89.74	6639	205	316	0.008	45
D	Cosmos 141 rocket	1967-12B	1967 Feb 8.43 7.74 days 1967 Feb 16.17	Cylinder 2500?	7.5 long 2.6 dia	1967 Feb 12.3	72.87	89.25	6615	197	276	0.006	35
D	Cosmos 142	1967-13A	1967 Feb 14.42 142.19 days 1967 Jul 6.61	Ellipsoid 400?	1.8 long 1.2 dia	1967 Feb 14.6 1967 May 23.5	48.3 48.39	100.25 94.61	7150 6880	207 197	1336 807	0.079 0.044	101 -
D	Cosmos 142 rocket	1967-13B	1967 Feb 14.42 121.28 days 1967 Jun 15.70	Cylinder 1500?	8 long 1.65 dia	1967 Feb 14.6 1967 May 8.0	48.4 48.38	100.35 94.44	7156 6872	210 199	1346 788	0.079 0.043	103 -
L	Diademe 2	1967-14A	1967 Feb 15.44 200 years	Cylinder + 4 vanes 22.7	0.20 long 0.5 dia	1967 Apr 15.5	39.45	110.01	7614	591	1881	0.085	-
	Diademe 2 rocket	1967-14B	1967 Feb 15.44 100 years	Cylinder 68	2.1 long 0.65 dia	1967 Apr 15.5	39.45	110.09	7618	590	1890	0.085	-
1d	Fragments	1967-14C-H											

	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D r?	[Thor Agena D]	1967-15A	1967 Feb 22.92 17.02 days 1967 Mar 11.94	Cylinder 1st 14 days 1500? then 700?	8 long? 1.5 dia	1967 Feb 23.8	80.03	90.12	6658	180	380	0.015	159
D	[Titan 3B Agena D]	1967-16A	1967 Feb 24.83 10.15 days 1967 Mar 6.98	Cylinder 3000?	8 long? 1.5 dia	1967 Feb 25.4	106.98	90.02	6653	135	414	0.021	138
D R	Cosmos 143	1967-17A	1967 Feb 27.35 7.89 days 1967 Mar 7.24	Sphere-cylinder 4750?	4.3 long 2.4 dia	1967 Feb 27.7	64.99	89.53	6629	204	297	0.007	15
D	Cosmos 143 rocket	1967-17B	1967 Feb 27.35 9.78 days 1967 Mar 9.13	Cylinder 1440	3.8 long 2.6 dia	1967 Feb 28.5	65.02	89.65	6635	217	297	0.006	55
	Cosmos 144	1967-18A	1967 Feb 28.61 20 years	Cylinder + 2 vanes 2000?	5 long? 1.5 dia?	1967 Feb 28.8	81.25	96.88	6987	574	644	0.005	274
	Cosmos 144 rocket	1967-18B	1967 Feb 28.61 25 years	Cylinder 1440	3.8 long 2.6 dia	1967 Mar 2.2	81.21	97.01	6993	521	709	0.013	190
D	Fragment	1967-18C											
D	Cosmos 145	1967-19A	1967 Mar 3.28 371.11 days 1968 Mar 8.39	Ellipsoid 400?	1.8 long 1.2 dia	1967 Mar 3.7 1967 Nov 8.0 1968 Jan 8.0	48.42 48.42 48.35	108.60 99.96 96.51	7544 7136 6972	215 204 197	2116 1312 991	0.126 0.078 0.057	101 - -
D	Cosmos 145 rocket	1967-19B	1967 Mar 3.28 272.86 days 1967 Dec 1.14	Cylinder 1500?	8 long 1.65 dia	1967 Mar 3.7 1967 Sep 8.0 1967 Oct 23.7	48.40 48.39 48.37	108.33 100.55 96.15	7533 7165 6954	213 203 194	2096 1371 958	0.125 0.081 0.055	102 - -

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	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
	OSO 3	1967-20A	1967 Mar 8.68 20 years	Nonagon 281	0.94 long 1.12 dia	1967 Mar 9.6 1972 Feb 1.0	32.87 32.87	95.53 94.98	6928 6300	534 510	564 533	0.002 0.002	200 -
D	OSO 3 rocket	1967-20B	1967 Mar 8.68 1137.71 days 1970 Apr 19.39	Cylinder 24	1.5 long 0.46 dia	1967 Mar 9.6 1968 Mar 14.5 1969 Sep 16.0	32.86 32.86 32.86	95.48 94.96 93.47	6925 6899 6824	540 510 441	554 531 451	0.001 0.001 0.001	206 - -
D	Fragment	1967-20C											
D	Cosmos 146*	1967-21A	1967 Mar 10.54 0.99 day 1967 Mar 11.53	Sphere-cylinder + 2 wings 5375?	5.3 long 2.2 dia	1967 Mar 10.7	51.44	89.20	6615	177	296	0.009	92
D	Service module?	1967-21B	1967 Mar 10.54 8.65 days 1967 Mar 19.19	Cylinder + 2 wings? 2615?	3.0 long? 2.3 dia?	1967 Mar 15.0	51.52	89.16	6613	175	294	0.009	107
D	Descent module?	1967-21D	1967 Mar 10.54 8.35 days 1967 Mar 18.89	Spheroid? 2760?	2.3 dia?	1967 Mar 15.0	51.51	89.15	6612	176	292	0.009	-
D	Fragment**	1967-21C											
D R	Cosmos 147	1967-22A	1967 Mar 13.51 7.76 days 1967 Mar 21.27	Sphere-cylinder 4750?	4.3 long 2.4 dia	1967 Mar 14.1	64.57	89.42	6626	195	301	0.008	39
D	Cosmos 147 rocket	1967-22B	1967 Mar 13.51 8.78 days 1967 Mar 22.29	Cylinder 1440	3.8 long 2.6 dia	1967 Mar 17.2	64.58	89.27	6617	206	272	0.005	74
D	Cosmos 148	1967-23A	1967 Mar 16.74 51.77 days 1967 May 7.51	Ellipsoid 400?	1.8 long 1.2 dia	1967 Mar 19.6	71.00	91.26	6715	270	404	0.010	68
D	Cosmos 148 rocket	1967-23B	1967 Mar 16.74 28.66 days 1967 Apr 14.40	Cylinder 1500?	8 long 1.65 dia	1967 Mar 19.4	71.02	91.08	6706	274	381	0.008	69

* Cosmos 146 apparently split into 2 modules on 1967 Mar 11.53 while over Tyuratam (1967-21D retained the 21A designation in USA)

** This was probably Cosmos 146 rocket, lifetime 1 day, similar to Cosmos 154 rocket.

	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D	Cosmos 149	1967-24A	1967 Mar 21.42 17.28 days 1967 Apr 7.70	Ellipsoid + annular tail 300?	6.5 long 1.2 dia	1967 Mar 23.1	48.40	89.76	6643	245	285	0.003	277
D	Cosmos 149 rocket	1967-24B	1967 Mar 21.42 3.05 days 1967 Mar 24.47	Cylinder 1500?	8 long 1.65 dia	1967 Mar 23.8	48.44	88.43	6579	181	221	0.003	273
D	Fragments	1967-24C-T											
D R	Cosmos 150	1967-25A	1967 Mar 22.53 7.75 days 1967 Mar 30.28	Sphere-cylinder 3530?	5 long? 2.4 dia	1967 Mar 24.1	65.64	90.04	6655	204	350	0.011	54
D	Cosmos 150 rocket	1967-25B	1967 Mar 22.53 8.32 days 1967 Mar 30.85	Cylinder 2500?	7.5 long 2.6 dia	1967 Mar 24.1	65.67	89.65	6636	191	324	0.010	39
	Intelsat 2C(F-3)	1967-26A	1967 Mar 23.06 > million years	Cylinder 87	0.67 long 1.42 dia	1967 Apr 7.7 1977 May 13.0	1.37 7.30	1434 1434.95	42107 42142	35687 35687	35771 35841	0.001 0.002	81 313
D	Intelsat 2C second stage	1967-26B	1967 Mar 23.06 106.4 days 1967 Jul 7.5	Cylinder 400?	4.9 long 1.43 dia	1967 Mar 24.0 1967 May 31.5	28.80 28.76	92.98 91.16	6804 6716	242 231	610 445	0.027 0.016	145 -
	Intelsat 2C third stage	1967-26C	1967 Mar 23.06 25 years?	Cylinder 24	1.5 long 0.46 dia	1967 Mar 25.0	26.68	669.8	25351	289	37656	0.737	178*

*Approximate orbit.

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	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
	Cosmos 151	1967-27A	1967 Mar 24.49 30 years	Cylinder + paddles 850?	2 long? 1 dia?	1967 Mar 24.9	56.07	97.14	7002	596	652	0.004	125
	Cosmos 151 rocket	1967-27B	1967 Mar 24.49 25 years	Cylinder 2200?	7.4 long 2.4 dia	1967 Mar 31.5	56.06	97.13	7001	594	653	0.004	-
D	Fragments	1967-27C,D											
D	Cosmos 152	1967-28A	1967 Mar 25.29 132.88 days 1967 Aug 5.17	Ellipsoid 400?	1.8 long 1.2 dia	1967 Mar 26.6 1967 Jun 23.0	70.98 70.99	92.13 90.63	6758 6684	272 245	488 367	0.016 0.009	78 -
D	Cosmos 152 rocket	1967-28B	1967 Mar 25.29 57.78 days 1967 May 22.07	Cylinder 1500?	8 long 1.65 dia	1967 Mar 26.6 1967 May 8.0	71.00 70.97	92.00 90.27	6752 6667	273 242	475 335	0.015 0.007	79 -
D	[Thor Agena D]	1967-29A	1967 Mar 30.79 17.65 days 1967 Apr 17.44	Cylinder 1500?	8 long? 1.5 dia	1967 Mar 30.9	85.03	89.45	6625	167	326	0.012	181
D R	Cosmos 153	1967-30A	1967 Apr 4.58 7.74 days 1967 Apr 12.32	Sphere-cylinder 4750?	4.3 long 2.4 dia	1967 Apr 5.3	64.59	89.26	6617	199	279	0.006	36
D	Cosmos 153 rocket	1967-30B	1967 Apr 4.58 7.06 days 1967 Apr 11.64	Cylinder 1440	3.8 long 2.6 dia	1967 Apr 7.3	64.58	89.09	6608	210	250	0.003	-
D	ATS 2	1967-31A	1967 Apr 6.14 880.81 days 1969 Sep 2.95	Cylinder 370	1.83 long 1.42 dia	1967 Apr 9.2 1968 Mar 12.4 1969 Feb 15.3	28.40 28.42 28.27	218.9 177.5 132.3	12029 10486 8601	178 176 169	11124 8040 4276	0.455 0.375 0.239	- 15 -
D	ATS 2 rocket	1967-31B	1967 Apr 6.14 450.1 days 1968 Jun 29.2	Cylinder 700?	6 long? 1.5 dia	1967 Apr 9.8 1968 Mar 9.2 1968 May 8.0	28.51 28.39 28.30	218.2 157.9 129.4	11999 9739 8474	149 147 140	11092 6575 4052	0.456 0.330 0.231	- 43 -

	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D	Cosmos 154*	1967-32A	1967 Apr 8.38 2.2 days 1967 Apr 10.6	Sphere-cylinder + 2 wings 5375?	5.3 long 2.2 dia	1967 Apr 8.7	51.30	88.50	6581	183	223	0.003	100
D	Cosmos 154 rocket	1967-32B	1967 Apr 8.38 2.3 days 1967 Apr 10.7	Cylinder 4000?	12 long? 4 dia	1967 Apr 10.2	51.35	87.70	6542	157	170	0.001	-
D	Fragment	1967-32C											
D R	Cosmos 155	1967-33A	1967 Apr 12.46 7.98 days 1967 Apr 20.44	Sphere-cylinder 5530?	5 long? 2.4 dia	1967 Apr 12.8	51.80	89.11	6611	193	272	0.006	17
D	Cosmos 155 rocket	1967-33B	1967 Apr 12.46 4.02 days 1967 Apr 16.48	Cylinder 2500?	7.5 long 2.6 dia	1967 Apr 13.5	51.78	89.00	6605	194	260	0.005	-
D	Fragments	1967-33C, D											
	Transit 15 [Scout]	1967-34A	1967 Apr 14.14 1000 years	Octagon + 4 vanes 60?	0.25 long 0.46 dia	1967 Apr 14.3	90.23	106.60	7446	1053	1083	0.002	101
	Altair rocket	1967-34B	1967 Apr 14.14 1000 years	Cylinder 24	1.5 long 0.46 dia	1967 May 2.4	90.25	106.59	7445	1052	1083	0.002	58
	Fragments	1967-34C-G											
	Essa 5	1967-36A	1967 Apr 20.47 10000 years	Cylinder 145	0.56 long 1.07 dia	1967 Apr 21.3	101.97	113.63	7770	1361	1423	0.004	353
	Essa 5 rocket	1967-36B	1967 Apr 20.47 5000 years	Cylinder 24	1.5 long 0.46 dia	1967 Apr 22.6	101.95	113.63	7770	1361	1423	0.004	349
	Fragments	1967-36C,D											

Space Vehicle: Surveyor 3, 1967-35A; and Centaur 12, 1967-35B, in highly eccentric orbit.

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* Cosmos 154 and Cosmos 146 were Zond test flights.

	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D M P	Soyuz 1 *	1967-37A	1967 Apr 23.03 1.11 days 1967 Apr 24.14	Sphere-cylinder + 2 wings 6450	7.5 long 2.2 dia	1967 Apr 23.4	51.64	88.52	6583	198	211	0.001	324
D	Soyuz 1 rocket	1967-37B	1967 Apr 23.03 1.88 days 1967 Apr 24.91	Cylinder 2500?	7.5 long 2.6 dia	1967 Apr 23.6	51.66	88.39	6576	185	211	0.002	328
D	San Marco 2 **	1967-38A	1967 Apr 26.42 171.10 days 1967 Oct 14.52	Sphere 129	0.66 dia	1967 Apr 26.6 1967 Aug 14.5	2.89 2.89	93.93 91.76	6856 6745	217 199	738 535	0.038 0.025	296 -
D	San Marco 2 rocket	1967-38B	1967 Apr 26.42 33 days 1967 May 29	Cylinder 24	1.5 long 0.46 dia	1967 Apr 30.5	3.16	93.52	6835	204	710	0.037	349
	Cosmos 156	1967-39A	1967 Apr 27.53 25 years	Cylinder + 2 vanes 2000?	5 long? 1.5 dia?	1967 Apr 28.8	81.17	96.96	6992	593	635	0.003	275
	Cosmos 156 rocket	1967-39B	1967 Apr 27.53 30 years	Cylinder 1440	3.8 long 2.6 dia	1967 Apr 29.4	81.23	97.20	7003	540	710	0.012	190
	Vela 7	1967-40A	1967 Apr 28.42 >million years	Icosahedron 231	1.17 long 1.42 dia	1967 May 1.4	33.06	6671.8	117353	107337	114612	0.031	87
	Vela 8	1967-40B	1967 Apr 28.42 >million years	Icosahedron 231	1.17 long 1.42 dia	1967 May 1.4	33.06	6671.8	117353	107337	114612	0.031	87
	ERS 18	1967-40C	1967 Apr 28.42 million years?	Octahedron 9	0.28 side	1967 May 1.4	32.8	2829.6	66295	8604	111229	0.774	173
	ERS 20 (OV5-3)	1967-40D	1967 Apr 28.42 million years?	Octahedron 8.6	0.28 side	1967 May 1.4	32.8	2829.6	66295	8604	111229	0.774	173
	ERS 27 (OV5-1)	1967-40E	1967 Apr 28.42 million years?	Octahedron 7.4	0.28 side	1967 May 1.4	32.8	2829.6	66295	8604	111229	0.774	173
	Transtage 10 [Titan 3C]	1967-40F	1967 Apr 28.42 million years?	Cylinder 1500?	6 long? 3 dia	Orbit similar to 1967-40E							

* Crashed after unstable re-entry (one solar panel may not have unfolded). ** First satellite launch from Indian Ocean platform (Kenya).

	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D	Ariel 3	1967-42A	1967 May 5.67 1318.37 days 1970 Dec 14.04	Cylinder + 4 paddles 89.8	0.91 long 0.76 dia	1967 May 5.8 1969 Sep 16.0 1970 May 1.0	80.17 80.18 80.1	95.69 94.33 93.40	6931 6863 6818	497 451 414	608 518 466	0.008 0.005 0.004	170 - -
D	Ariel 3 rocket	1967-42B	1967 May 5.67 1309.98 days 1970 Dec 5.65	Cylinder 24	1.5 long 0.46 dia	1967 May 9.1 1969 Sep 16.0 1970 May 1.0	80.18 80.18 80.1	95.80 94.40 93.42	6935 6866 6819	494 449 412	619 527 470	0.009 0.006 0.004	161 - -
D	Fragments	1967-42C,D											
D	[Thorad Agena D]	1967-43A	1967 May 9.91 64.62 days 1967 Jul 13.53	Cylinder 2000?	8 long? 1.5 dia?	1967 May 10.1	85.10	94.36	6867	200	777	0.042	154
	Capsule	1967-43B	1967 May 9.91 50 years	Octagon? 60?	0.3 long? 0.9 dia?	1967 May 10.0	85.10	98.38	7060	555	809	0.018	173
D	Fragment	1967-43C											
D R	Cosmos 157	1967-44A	1967 May 12.44 7.93 days 1967 May 20.37	Sphere-cylinder 4750?	4.3 long 2.4 dia	1967 May 12.8	51.26	89.60	6634	249	262	0.001	67
D	Cosmos 157 rocket	1967-44B	1967 May 12.44 11.94 days 1967 May 24.38	Cylinder 1440	3.8 long 2.6 dia	1967 May 15.7	51.28	89.40	6625	234	260	0.002	121
D	Fragments	1967-44C-E											
	Cosmos 158	1967-45A	1967 May 15.46 200 years	Cylinder? 750?	1.4 long? 2.0 dia?	1967 May 15.7	74.03	100.40	7158	738	822	0.006	148
	Cosmos 158 rocket	1967-45B	1967 May 15.46 200 years	Cylinder 2200?	7.4 long 2.4 dia	1967 May 16.1	74.01	100.59	7168	732	847	0.008	148
	Fragments	1967-45C,D											

Space Vehicle: Lunar Orbiter 4, 1967-41A; and Agena rocket, 1967-41B was initially in earth orbit.

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	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D	Cosmos 159*	1967-46A	1967 May 16.91 3832 days? 1977 Nov 11?	Cylinder 4490 full? 1465 empty?	3.0 long? 2.3 dia?	1967 May 31.5 1970 May 16.5 1974 Mar 1.0	51.60 53.38 53.6	1174.2 1174.1 1174.0	36872 36864 36865	350 2502 1124	60637 58470 59849	0.818 0.759 0.796	- - -
D	Cosmos 159 launcher rocket	1967-46B	1967 May 16.91 12.70 days 1967 May 29.61	Cylinder 2500?	7.5 long 2.6 dia	1967 May 17.3	51.84	90.80	6695	203	431	0.017	70
D	Cosmos 159 launcher	1967-46C	1967 May 16.91 17.00 days 1967 Jun 2.91	Irregular	2 long? 1 dia?	1967 May 18.2	51.74	90.50	6680	208	395	0.014	72
D	Cosmos 159 torus	1967-46F	1967 May 16.91 3810 days? 1977 Oct 20?	Annulus 1875 full? 215 empty?	0.62 long? 1.23 to 2.25 dia?	1967 Jun 13.0 1970 May 16.5 1974 Mar 1.0	50.4 53.37 53.6	1171.0 1171.0 1171.1	36802 36801 36804	380 2490 1129	60467 58356 59722	0.816 0.759 0.796	- - -
D	Fragments	1967-46D,E											
D	Cosmos 160**	1967-47A	1967 May 17.67 0.8 day 1967 May 18.5	Cylinder?	2 long? 1 dia?	1967 May 17.8	49.66	87.58	6535	137	177	0.003	-
D	Cosmos 160 rocket	1967-47B	1967 May 17.67 0.8 day 1967 May 18.5	Cylinder 1500?	8 long? 2.5 dia?			orbit similar to 1967-47A					
	Transit 16 [Scout]	1967-48A	1967 May 18.38 1000 years	Octagon + 4 vanes 60?	0.25 long 0.46 dia	1967 May 19.8	89.57	107.04	7467	1074	1105	0.002	187
	Altair rocket	1967-48B	1967 May 18.38 1000 years	Cylinder 24	1.5 long 0.46 dia	1967 Jun 2.7	89.58	107.04	7466	1073	1106	0.002	144
D R	Cosmos 161	1967-49A	1967 May 22.58 7.79 days 1967 May 30.37	Sphere-cylinder 5530?	5 long? 2.4 dia	1967 May 24.8	65.64	89.71	6639	201	321	0.009	51
D	Cosmos 161 rocket	1967-49B	1967 May 22.58 6.07 days 1967 May 28.65	Cylinder 2500?	7.5 long 2.6 dia	1967 May 24.3	65.64	89.45	6626	135	301	0.008	42

* Probably a test of the Soyuz propulsion module.

** Disintegrated into more than 16 pieces on first revolution

	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D	[Atlas Agena D] *	1967-50A	1967 May 22.77 8.18 days 1967 May 30.95	Cylinder 700?	6.3 long 1.5 dia	1967 May 28.4	91.49	88.82	6592	135	293	0.012	117
D	Capsule [Atlas Agena D]	1967-50B	1967 May 22.77 4.9 days 1967 May 27.7	- 500?	1.5 dia?	1967 May 27.0	91.49	88.42	6572	148	240	0.007	125
D	Explorer 34 (Imp 5)	1967-51A	1967 May 24.59 710.47 days 1969 May 4.06	Octagon + 4 vanes 75	0.25 long 0.71 dia	1967 May 24.6 1968 Jul 26.5 1969 Feb 15.5	67.17 66.97 68.50	6346.1 6222.8 6218.3	113691 112071 112015	242 4006 2031	214383 207380 209242	0.942 0.907 0.925	180 - -
D	Explorer 34 rocket	1967-51B	1967 May 24.59 23 months? 1969 May ?	Cylinder 24	1.5 long 0.46 dia	orbit similar to 1967-51A							
D	Molniya 1E	1967-52A	1967 May 24.95 1647 days 1971 Nov 26	Windmill 1000?	3.4 long 1.6 dia	1967 May 29.9 1969 Mar 31.7 1970 Oct 31.7	64.88 64.87 64.8	715.5 710.4 711.77	26500 26376 26408	460 1188 567	39785 38807 39492	0.742 0.713 0.737	285 - -
D	Molniya 1E launcher rocket	1967-52B	1967 May 24.95 11 days 1967 Jun 5	Cylinder 2500?	7.5 long 2.6 dia	1967 May 25.4	64.87	90.88	6696	197	438	0.018	55
D	Molniya 1E launcher	1967-52C	1967 May 24.95 21.98 days 1967 Jun 15.93	Irregular	2 long? 1 dia?	1967 May 25.8	64.85	91.26	6716	203	472	0.020	62
D	Molniya 1E rocket	1967-52F	1967 May 24.95 1667 days 1971 Dec 16	Cylinder 440	2.0 long 2.0 dia	1969 May 16.3 1970 Dec 1.0	64.87 64.8	709.62 709.54	26354 26352	1194 554	38758 39394	0.713 0.737	- -
D	Fragments	1967-52D,E,G											

* Carried LOGACS - LOW Gravity Accelerometer Calibration System.

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	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
	Agena D rocket	1967-53A	1967 May 31.40 500 years	Cylinder 700?	6 long? 1.5 dia	1967 Jun 1.5	69.98	103.45	7299	914	928	0.001	343
	Surcal	1967-53B	1967 May 31.40 500 years	Sphere 2.48	0.51 dia	1967 Jun 1.1	69.98	103.55	7305	919	934	0.001	33
	GGSE 4	1967-53C	1967 May 31.40 500 years	Ellipsoid? 4?	0.3 dia?	1967 Jun 1.1	69.98	103.45	7300	915	929	0.001	13
	GGSE 5	1967-53D	1967 May 31.40 500 years	Ellipsoid? 4?	0.3 dia?	1967 Jun 5.7	69.98	103.45	7300	915	929	0.001	20
	[Thor Agena D]	1967-53E	1967 May 31.40 500 years	-	-	1967 Jun 15.5	69.91	103.38	7297	916	921	0.001	-
	Timation 1*	1967-53F	1967 May 31.40 500 years	Rectangular box 38	0.81 × 0.41 × 0.20	1968 Jan 15.5	69.91	103.39	7298	915	926	0.001	-
	[Thor Agena D]	1967-53G	1967 May 31.40 500 years	-	-	1968 Jan 15.5	69.91	103.40	7299	915	927	0.001	-
	[Thor Agena D]	1967-53H	1967 May 31.40 500 years	-	-	1968 Jan 15.5	69.91	103.39	7298	915	926	0.001	-
	Surcal (150B)	1967-53J	1967 May 31.40 50 years	Sphere 1.55	0.41 dia	1968 Jan 15.5	69.91	103.38	7297	917	922	0.0003	-
D R	Cosmos 162	1967-54A	1967 Jun 1.45 7.99 days 1967 Jun 9.44	Sphere-cylinder 5530?	5 long? 2.4 dia	1967 Jun 1.7	51.81	89.19	6614	196	275	0.006	19
D	Cosmos 162 rocket	1967-54B	1967 Jun 1.45 3.06 days 1967 Jun 4.51	Cylinder 2500?	7.5 long 2.6 dia	1967 Jun 3.8	51.78	88.15	6563	159	211	0.004	9
D	Fragment	1967-54C											

*Time/navigation satellite

	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D	[Atlas Agena D]	1967-55A	1967 Jun 4.75 8.17 days 1967 Jun 12.92	- 500?	1.5 dia?	1967 Jun 6.9 1967 Jun 10.4	104.88 104.87	90.57 90.33	6681 6668	149 145	456 434	0.023 0.022	153 139
D	Agena D rocket	1967-55B	1967 Jun 4.75 1 day 1967 Jun 6	Cylinder 700?	8 long? 1.5 dia	1967 Jun 5.4	104.87	90.28	6668	143	436	0.022	150
D	Cosmos 163	1967-56A	1967 Jun 5.21 128.51 days 1967 Oct 11.72	Ellipsoid 400?	1.8 long 1.2 dia	1967 Jun 5.4 1967 Aug 15.8	48.38 48.39	93.07 92.01	6806 6754	244 247	611 504	0.027 0.019	124 -
D	Cosmos 163 rocket	1967-56B	1967 Jun 5.21 99.20 days 1967 Sep 12.41	Cylinder 1500?	8 long 1.65 dia	1967 Jun 5.9	48.43	93.05	6802	254	594	0.025	111
D R	Cosmos 164	1967-57A	1967 Jun 8.55 5.76 days 1967 Jun 14.31	Sphere-cylinder 5530?	5 long? 2.4 dia	1967 Jun 9.2	65.59	89.51	6629	185	317	0.010	44
D	Cosmos 164 rocket	1967-57B	1967 Jun 8.55 9.11 days 1967 Jun 17.66	Cylinder 2500?	7.5 long 2.6 dia	1967 Jun 9.2	65.65	89.37	6622	197	290	0.007	32
D	Fragment	1967-57C											
D	Venus 4 launcher	1967-58B	1967 Jun 12.11 1.76 days 1967 Jun 13.87	Irregular	2 long? 1 dia?	1967 Jun 12.4	51.80	87.92	6553	162	188	0.002	16
D	Venus 4 launcher rocket	1967-58C	1967 Jun 12.11 0.78 day 1967 Jun 12.89	Cylinder 2500?	7.5 long 2.6 dia	1967 Jun 12.4	51.78	88.30	6571	173	212	0.003	271
D	Fragment	1967-58D											

Space Vehicle: Venus 4, 1967-58A

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	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D	Cosmos 165	1967-59A	1967 Jun 12.76 216.90 days 1968 Jan 15.66	Ellipsoid 400?	1.8 long 1.2 dia	1967 Jun 14.0 1967 Nov 8.0	81.89 81.88	102.08 96.13	7235 6951	198 190	1515 957	0.091 0.055	71 -
D	Cosmos 165 rocket	1967-59B	1967 Jun 12.76 142.16 days 1967 Nov 1.92	Cylinder 1500?	8 long 1.65 dia	1967 Jun 15.7 1967 Sep 15.5	81.91 81.88	101.88 96.73	7226 6980	197 197	1498 1007	0.090 0.058	66 -
D	Cosmos 166	1967-61A	1967 Jun 16.20 130.89 days 1967 Oct 25.08	Ellipsoid + 8 panels 400?	1.8 long 1.2 dia	1967 Jun 24.6 1967 Sep 8.0	48.43 48.42	92.84 91.78	6795 6741	281 270	553 456	0.020 0.014	159 -
D	Cosmos 166 rocket	1967-61B	1967 Jun 16.20 116.82 days 1967 Oct 11.01	Cylinder 1500?	8 long 1.65 dia	1967 Jun 17.5 1967 Sep 8.0	48.43 48.42	92.83 91.46	6794 6726	280 266	552 430	0.020 0.012	128 -
D	[Thorad Agena D]	1967-62A	1967 Jun 16.90 33.16 days 1967 Jul 20.06	Cylinder 2000?	8 long? 1.5 dia	1967 Jun 17.7	80.02	89.97	6652	181	367	0.014	166
D	Capsule**	1967-62B	1967 Jun 16.90 493.12 days 1968 Oct 22.02	Octagon? 60?	0.3 long? 0.9 dia?	1967 Jun 30.8 1968 Mar 14.5 1968 Jun 30.5	80.20 80.19 80.13	94.81 93.76 92.89	6887 6835 6793	501 451 407	517 464 423	0.001 0.001 0.001	278 - -
D	Cosmos 167*	1967-63A	1967 Jun 17.11 7.99 days 1967 Jun 25.10	Cylinder 6560? full	7 long? 2.0 max dia	1967 Jun 17.5	51.79	89.22	6616	211	264	0.004	38
D	Cosmos 167 launcher	1967-63B	1967 Jun 17.11 4.88 days 1967 Jun 21.99	Irregular	2 long? 1 dia?	1967 Jun 18.5	51.80	89.00	6605	187	266	0.006	26
D	Cosmos 167 launcher rocket	1967-63C	1967 Jun 17.11 9.32 days 1967 Jun 26.43	Cylinder 2500?	7.5 long 2.6 dia	1967 Jun 17.7	51.87	88.10	6560	149	215	0.005	87
D	Fragments	1967-63D-F											

Space Vehicle: Mariner 5, 1967-60A; also Agena rocket, 1967-60B. *Possibly an attempted Venus Probe, (payload about 1106 kg)
**1967-62B ejected from 1967-62A on 1967 Jun 16.97.

	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D	[Titan 3B Agena D]	1967-64A	1967 Jun 20.68 10.22 days 1967 Jun 30.90	Cylinder 3000?	8 long? 1.5 dia	1967 Jun 22.6	111.40	89.01	6604	127	325	0.015	107
	Secor 9 (EGRS 9)	1967-65A	1967 Jun 29.88 100000 years	Rectangular box 20	0.33x0.28 x 0.23	1967 Jun 30.9	89.91	172.22	10253	3803	3947	0.007	343
	Aurora 1 [Thor Burner 2]	1967-65B	1967 Jun 29.88 100000 years	Rectangular box 21.5	0.61x0.36 x 0.24	1967 Jul 19.7	89.82	172.18	10251	3800	3947	0.007	319
	Burner 2 rocket	1967-65C	1967 Jun 29.88 100000 years	Sphere-cone? 66?	1.32 long? 0.94 dia?	1967 Jul 24.5	89.83	172.18	10251	3801	3945	0.007	305
	IDCSP 3-1	1967-66A	1967 Jul 1.55 >million years	Polyhedron (26 faces) 45	0.8 long 0.9 dia	1967 Jul 24.5	7.18	1308.9	39635	32986	33528	0.007	-
	IDCSP 3-2	1967-66B	1967 Jul 1.55 >million years	Polyhedron (26 faces) 45	0.8 long 0.9 dia	1967 Jul 24.5	7.22	1309.8	39655	33006	33548	0.007	-
	IDCSP 3-3	1967-66C	1967 Jul 1.55 >million years	Polyhedron (26 faces) 45	0.8 long 0.9 dia	1967 Jul 6.2	7.2	1311.6	39695	33079	33555	0.006	306
	IDCSP 3-4 (DATS)**	1967-66D	1967 Jul 1.55 >million years	Polyhedron (26 faces) 68	0.8 long 0.9 dia	1967 Jul 6.2	7.1	1313.6	39733	33156	33553	0.005	297
	LES 5	1967-66E	1967 Jul 1.55 >million years	Cylinder 102	1.67 long 1.37 dia	1968 Jan 15.5	6.8	1316.2	39785	33178	33636	0.006	-
	DODGE 1†	1967-66F	1967 Jul 1.55 >million years	Octagonal door-knob 195	2.41 long 1.22 dia	1968 Jan 15.5	6.2	1318.9	39843	33270	33659	0.005	-
	Transtage 11 [Titan 3C]	1967-66G	1967 Jul 1.55 >million years	Cylinder 1500?	6 long? 3 dia	1967 Sep 15.5	7.0	1320.8	39884	33327	33685	0.004	-*

* Approximate orbit

** De-spun Antenna Test Satellite.

† Department of Defense Gravity Experiment.

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	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D R	Cosmos 168	1967-67A	1967 Jul 4.25 7.98 days 1967 Jul 12.23	Sphere-cylinder 5530?	5 long? 2.4 dia	1967 Jul 4.9	51.81	89.05	6609	198	264	0.005	15
D	Cosmos 168 rocket	1967-67B	1967 Jul 4.25 3.98 days 1967 Jul 8.23	Cylinder 2500?	7.5 long 2.6 dia	1967 Jul 5.5	51.81	88.80	6592	187	240	0.004	341
D	Fragment	1967-67C											
D R?	Cosmos 169	1967-69A	1967 Jul 17.70 0.06 day 1967 Jul 17.76	Cylinder?	2 long? 1 dia?	1967 Jul 17.7	49.68	87.78	6546	135	200	0.005	69
D	Cosmos 169 rocket	1967-69C	1967 Jul 17.70 0.31 day 1967 Jul 18.01	Cylinder 1500?	8 long? 2.5 dia?	1967 Jul 17.9	49.60	86.51	6481	102?	103?	0	-
D	Cosmos 169 launch platform	1967-69B	1967 Jul 17.70 0.5 day? 1967 Jul 18	Irregular	-	1967 Jul 17.7	49.60	87.02	6507	123?	129?	0	-
D	Fragments	1967-69D,E											
D	Explorer 35 second stage	1967-70B	1967 Jul 19.60 42.92 days 1967 Aug 31.52	Cylinder 350?	4.9 long 1.43 dia	1967 Jul 20.3 1967 Aug 14.5	29.56 29.55	103.30 97.28	7298 7011	155 149	1686 1116	0.105 0.069	77 -
D	[Thor Agena D]	1967-71A	1967 Jul 25.16 681.00 days 1969 Jun 5.16	Cylinder 1500?	8 long? 1.5 dia	1967 Jul 30.4 1968 Feb 29.8 1968 Oct 15.8	75.03 75.03 75.03	94.30 93.83 93.13	6864 6841 6806	458 437 410	513 488 446	0.004 0.004 0.003	42 - -
D	Fragments	1967-71B-D											

Space Vehicles: Surveyor 4, 1967-68A; also Centaur 13, 1967-68B in an highly eccentric orbit. Explorer 35 (Imp 6), 1967-70A is orbiting the moon; also Explorer 35 third stage rocket is in an heliocentric orbit.

	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D	OV1-86	1967-72A	1967 Jul 27.79 1670.91 days 1972 Feb 22.70	Cylinder + hemisphere 118	1.40 long 0.69 dia	1967 Aug 3.5 1969 Sep 16.0 1970 Sep 16.0	101.72 101.72 101.72	95.48 94.51 93.58	6920 6871 6826	480 446 415	604 540 481	0.009 0.007 0.005	51 - -
D	OV1-86 rocket	1967-72B	1967 Jul 27.79 1207 days 1970 Nov 15	Cylinder 70?	2.05 long 0.72 dia	1967 Aug 2.3 1969 Jan 31.7 1969 Dec 31.7	101.72 101.72 101.72	95.47 94.43 93.55	6919 6867 6825	479 426 400	603 552 493	0.009 0.009 0.007	53 - -
D	OV1-12 rocket	1967-72C	1967 Jul 27.79 3567 days 1977 May 2	Cylinder 70?	2.05 long 0.72 dia	1967 Aug 2.2 1969 Sep 16.0 1973 Feb 15.0	101.61 101.61 101.59	95.59 95.01 93.61	6925 6896 6828	540 510 445	554 526 454	0.001 0.001 0.001	287 - -
	OV1-12	1967-72D	1967 Jul 27.79 14 years	Cylinder + hemisphere 141	1.40 long 0.69 dia	1967 Aug 2.2 1970 Oct 31.7	101.62 101.62	95.62 95.04	6927 6898	542 513	556 526	0.001 0.001	282 -
D	Fragment	1967-72E											
D	OGO 4	1967-73A	1967 Jul 28.60 1845.84 days 1972 Aug 16.44	Box + booms 552	1.73 long 0.84 high 0.84 wide	1967 Jul 29.2 1969 Jul 31.7 1971 Aug 1.0	86.03 85.93 85.93	97.89 96.53 93.97	7035 6967 6846	411 403 370	903 775 565	0.035 0.027 0.014	153 - -
D	OGO 4 rocket	1967-73B	1967 Jul 28.60 2883.18 days 1974 May 15.78	Cylinder 700?	8 long 1.5 dia	1967 Aug 1.3 1969 Jul 31.7 1972 Aug 1.0	86.01 85.97 85.99	97.82 96.58 93.97	7032 6970 6846	415 402 367	893 782 568	0.034 0.027 0.015	146 - -
D R?	Cosmos 170	1967-74A	1967 Jul 31.70 0.06 day 1967 Jul 31.76	Cylinder?	2 long? 1 dia?	1967 Jul 31.7	49.46	88.19	6565	121	252	0.010	35
D	Cosmos 170 rocket	1967-74B	1967 Jul 31.70 0.30 day 1967 Aug 1.00	Cylinder? 1500?	8 long? 2.5 dia?	1967 Jul 31.7	49.40	88.33	6573	126	263	0.010	-
D	Cosmos 170 launch platform	1967-74C	1967 Jul 31.70 0.5 day? 1967 Aug 1	Irregular	-	1967 Jul 31.7	49.40	87.59	6535	123	191	0.005	-
D	Fragments	1967-74D,E											

Space Vehicle: Lunar Orbiter 5, 1967-75A; and Agena rocket, 1967-75B in a highly eccentric orbit.

Continued on Page 144

	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D	[Thorad Agena D]	1967-76A	1967 Aug 7.90 24.85 days 1967 Sep 1.75	Cylinder 2000?	8 long? 1.5 dia	1967 Aug 8.3	79.94	89.72	6638	174	346	0.013	180
D	Fragment	1967-76B											
D R?	Cosmos 171	1967-77A	1967 Aug 8.67 0.06 day 1967 Aug 8.73	Cylinder?	2 long? 1 dia?	1967 Aug 8.7	49.60	87.58	6536	138	177	0.003	-
D	Cosmos 171 launch platform	1967-77B	1967 Aug 8.67 0.60 day 1967 Aug 9.27	Irregular	-	1967 Aug 9.0	49.62	87.69	6541	130	200	0.005	59
D	Cosmos 171 rocket	1967-77D	1967 Aug 8.67 0.29 day 1967 Aug 8.96	Cylinder 1500?	8 long? 2.5 dia?	1967 Aug 8.7	49.61	87.41	6528	134?	165?	0.002?	-
D	Fragments	1967-77C,E											
D R	Cosmos 172	1967-78A	1967 Aug 9.24 7.94 days 1967 Aug 17.18	Sphere- cylinder 5530?	5 long? 2.4 dia	1967 Aug 9.6	51.80	89.40	6625	200	293	0.007	33
D	Cosmos 172 rocket	1967-78B	1967 Aug 9.24 4.25 days 1967 Aug 13.49	Cylinder 2500?	7.5 long 2.6 dia	1967 Aug 9.9	51.80	89.11	6612	188	280	0.007	15
D	[Titan 3B Agena D]	1967-79A	1967 Aug 16.71 13 days 1967 Aug 29	Cylinder 3000?	8 long? 1.5 dia	1967 Aug 17.3	111.88	90.43	6674	142	449	0.023	128

	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
	[Thor Burner 2]	1967-80A	1967 Aug 23.20 100 years	12-sided frustum 195	1.64 long 1.31 to 1.10 dia	1967 Aug 23.6	98.97	102.20	7241	834	892	0.004	101
	Burner 2 rocket	1967-80B	1967 Aug 23.20 80 years	Sphere-cone 66	1.32 long 0.94 dia	1967 Oct 9.2	98.95	102.20	7241	831	895	0.004	333
D	Cosmos 173	1967-81A	1967 Aug 24.21 115.53 days 1967 Dec 17.74	Ellipsoid 400?	1.8 long 1.2 dia	1967 Aug 24.8 1967 Nov 8.0	71.03 71.02	92.10 90.85	6757 6694	277 247	480 386	0.015 0.010	81 -
D	Cosmos 173 rocket	1967-81B	1967 Aug 24.21 67.33 days 1967 Oct 30.54	Cylinder 1500?	8 long 1.65 dia	1967 Aug 26.8 1967 Oct 8.0	71.02 71.02	92.06 90.70	6754 6687	281 262	470 357	0.014 0.007	78 -
D	Cosmos 174*	1967-82A	1967 Aug 31.33 487 days 1968 Dec 30	Windmill 1000?	3.4 long 1.6 dia	1967 Sep 6.4 1968 Mar 15.8 1968 Aug 15.8	64.85 64.87 65.0	715.0 714.5 711.4	26491 26474 26399	430 347 189	39796 39845 39853	0.743 0.746 0.751	285 - -
D	Cosmos 174 launcher rocket	1967-82B	1967 Aug 31.33 15.19 days 1967 Sep 15.52	Cylinder 2500?	7.5 long 2.6 dia	1967 Sep 1.5	64.84	91.06	6705	199	454	0.019	59
D	Cosmos 174 launcher	1967-82C	1967 Aug 31.33 18.87 days 1967 Sep 19.20	Irregular	-	1967 Sep 1.2	64.79	91.33	6721	202	484	0.012	62
D	Cosmos 174 rocket	1967-82E	1967 Aug 31.33 492 days 1969 Jan 4	Cylinder 440	2.0 long 2.0 dia	1967 Dec 27	64.86	710.9	26386	381	39635	0.744	-
D	Fragment	1967-82D											
D	Bios 2** adapter	1967-83A	1967 Sep 7.92 26.18 days 1967 Oct 4.10	Cylinder 360?	1.8 long 1.45 dia	1967 Sep 16.6	33.46	90.38	6678	286	313	0.002	55
D	Bios 2 rocket	1967-83B	1967 Sep 7.92 133.84 days 1968 Jan 19.76	Cylinder 400?	4.9 long 1.43 dia	1967 Sep 8.8 1967 Dec 8.0	32.94 32.94	92.08 90.82	6761 6700	321 285	445 358	0.009 0.005	211 -

* This is probably a Molniya satellite, later replaced by Molniya 1F (1967-99A).

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** Before 1967 Sep 9.8, Bios 2 adapter was attached to Bios 2 capsule, 1967-83C (see next page).

	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D R B	Bios 2 capsule	1967-83C	1967 Sep 7.92 1.87 days 1967 Sep 9.79	Blunt cone 150?	1.2 long 1.02 dia	1967 Sep 8.4	33.48	90.53	6685	296	318	0.002	20
D R	Cosmos 175	1967-85A	1967 Sep 11.44 7.82 days 1967 Sep 19.26	Sphere-cylinder 5530?	5 long? 2.4 dia	1967 Sep 11.8	72.93	90.20	6663	211	358	0.011	56
D	Cosmos 175 rocket	1967-85B	1967 Sep 11.44 12.13 days 1967 Sep 23.57	Cylinder 2500?	7.5 long 2.6 dia	1967 Sep 12.4	72.88	90.05	6656	205	351	0.011	49
D	Fragment	1967-85C											
D	Cosmos 176	1967-86A	1967 Sep 12.71 172.91 days 1968 Mar 3.62	Ellipsoid 400?	1.8 long 1.2 dia	1967 Sep 13.0 1968 Jan 8.0	81.89 81.8	102.19 96.08	7239 6949	136 183	1525 958	0.092 0.056	74 -
D	Cosmos 176 rocket	1967-86B	1967 Sep 12.71 91.13 days 1967 Dec 12.84	Cylinder* 1500?	8 long* 1.65 dia	1967 Sep 23.0 1967 Nov 8.0	81.83 81.8	101.85 96.71	7222 6979	204 196	1484 1006	0.089 0.058	- -
D	Fragments	1967-86C-M											
D	[Thorad Agena D]	1967-87A	1967 Sep 15.82 18.69 days 1967 Oct 4.51	Cylinder 2000?	8 long? 1.5 dia	1967 Sep 16.4	80.07	89.95	6648	150	339	0.018	174
D R	Cosmos 177	1967-88A	1967 Sep 16.25 7.99 days 1967 Sep 24.24	Sphere-cylinder 5530?	5 long? 2.4 dia	1967 Sep 16.4	51.84	89.29	6618	200	280	0.006	34
D	Cosmos 177 rocket	1967-88B	1967 Sep 16.25 3.42 days 1967 Sep 19.67	Cylinder 2500?	7.5 long 2.6 dia	1967 Sep 16.7	51.81	89.04	6607	196	262	0.005	14

Space Vehicle: Surveyor 5, 1967-84A; also Centaur 14, 1967-84B is in a highly eccentric orbit.

* Before explosion.

	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D R?	Cosmos 178	1967-89A	1967 Sep 19.62 0.06 day 1967 Sep 19.68	Cylinder	2 long? 1 dia?	1967 Sep 19.6	49.65	88.39	6576	138	258	0.009	-
D	Cosmos 178 launch platform	1967-89B	1967 Sep 19.62 0.45 day 1967 Sep 20.07	Irregular	-	1967 Sep 19.8	49.66	87.85	6548	130	209	0.006	60
D	Cosmos 178 rocket	1967-89C	1967 Sep 19.62 0.2 day 1967 Sep 19.8	Cylinder 1500?	8 long? 2.5 dia?	1967 Sep 19.7	49.60	87.41	6528	137	163	0.002	-
D	Fragment	1967-89D											
D	[Titan 3B Agena D]	1967-90A	1967 Sep 19.77 10.23 days 1967 Sep 30.00	Cylinder 3000?	8 long? 1.5 dia?	1967 Sep 21.4	106.10	89.75	6640	122	401	0.021	119
D R?	Cosmos 179	1967-91A	1967 Sep 22.59 0.06 day 1967 Sep 22.65	Cylinder	2 long? 1 dia?	1967 Sep 22.6	49.57	87.87	6551	139	207	0.005	-
D	Cosmos 179 launch platform	1967-91B	1967 Sep 22.59 0.43 day 1967 Sep 23.02	Irregular	-	1967 Sep 22.8	49.52	87.74	6544	120	212	0.007	32
D	Cosmos 179 rocket	1967-91C	1967 Sep 22.59 0.24 day 1967 Sep 22.83	Cylinder 1500?	8 long? 2.5 dia?	1967 Sep 22.7	49.40	87.39	6527	141	156	0.001	-
	Transit 1? [Scout]	1967-92A	1967 Sep 25.35 1000 years	Octagon + 4 vanes 60?	0.25 long 0.46 dia	1967 Sep 26.4	89.28	106.81	7457	1041	1116	0.005	189
	Altair rocket	1967-92B	1967 Sep 25.35 1000 years	Cylinder 24	1.5 long 0.46 dia	1967 Sep 26.4	89.29	106.80	7456	1040	1115	0.005	187
	Fragments	1967-92C, D											

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	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D R	Cosmos 180	1967-93A	1967 Sep 26.43 7.82 days 1967 Oct 4.25	Sphere-cylinder 5530?	5 long? 2.4 dia	1967 Sep 27.2	72.89	90.04	6653	208	341	0.010	56
D	Cosmos 180 rocket	1967-93B	1967 Sep 26.43 9.41 days 1967 Oct 5.84	Cylinder 2500?	7.5 long 2.6 dia	1967 Sep 26.8	72.89	90.00	6650	205	338	0.010	52
	Intelsat 2D (F-4)	1967-94A	1967 Sep 28.03 > million years	Cylinder 87	0.67 long 1.42 dia	1967 Sep 28.1 1967 Oct 15.5 1977 May 13.0	26.43 0.93 7.41	655.0 1438.3 1437.51	24980 42208 42192	305 35747 35805	36897 35913 35823	0.732 0.002 0.0002	179 - 63
D	Intelsat 2D second stage	1967-94B	1967 Sep 28.03 89.01 days 1967 Dec 26.04	Cylinder 400?	4.9 long 1.43 dia	1967 Oct 2.6 1967 Nov 23.0	28.74 28.74	92.65 91.33	6790 6724	242 231	582 461	0.025 0.017	182 -
	Intelsat 2D third stage	1967-94C	1967 Sep 28.03 30 years?	Cylinder 24	1.5 long 0.46 dia	1967 Sep 28.3	26.44	625.4	24235	307	35406	0.724	179
D	Fragment	1967-94D											
D	Molniya 1F	1967-95A	1967 Oct 3.21 518.76 days 1969 Mar 4.97	Windmill 1000?	3.4 long 1.6 dia	1967 Oct 9.7 1968 Mar 15.8 1968 Oct 23.5	64.96 64.93 65.2	718.03 716.23 707.35	26563 26519 26299	502 338 173	39868 39943 39668	0.741 0.747 0.751	285 - -
D	Molniya 1F launcher	1967-95B	1967 Oct 3.21 18.25 days 1967 Oct 21.46	Irregular	-	1967 Oct 9.0	64.79	90.95	6699	200	441	0.018	65
D	Molniya 1F launcher rocket	1967-95C	1967 Oct 3.21 14.16 days 1967 Oct 17.37	Cylinder 2500?	7.5 long 2.6 dia	1967 Oct 11.0	64.81	90.27	6667	195	382	0.014	64
D	Molniya 1F rocket	1967-95D	1967 Oct 3.21 496.70 days 1969 Feb 10.91	Cylinder 440	2.0 long 2.0 dia	1967 Dec 27 1968 Aug 15.8 1968 Nov 8.0	64.94 65.00 65.2	709.7 708.5 699.5	26356 26343 26104	420 227 151	39536 39703 39301	0.742 0.749 0.750	- - -

	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
	[Thor Burner 2]	1967-96A	1967 Oct 11.33 80 years	12-sided frustum 195	1.64 long 1.31 to 1.10 dia	1967 Oct 15.8	99.16	100.18	7144	667	866	0.014	355
	Burner 2 rocket	1967-96B	1967 Oct 11.33 60 years	Sphere-cone 66	1.32 long 0.94 dia	1967 Oct 13.0	99.12	100.18	7144	673	859	0.013	3
D R	Cosmos 181	1967-97A	1967 Oct 11.48 7.78 days 1967 Oct 19.26	Sphere-cylinder 5530?	5 long? 2.4 dia	1967 Oct 12.0	65.61	89.72	6639	194	327	0.010	47
D	Cosmos 181 rocket	1967-97B	1967 Oct 11.48 7.53 days 1967 Oct 19.01	Cylinder 2500?	7.5 long 2.6 dia	1967 Oct 14.1	65.62	89.15	6612	188	280	0.007	32
D R	Cosmos 182	1967-98A	1967 Oct 16.33 7.93 days 1967 Oct 24.26	Sphere-cylinder 5530?	5 long? 2.4 dia	1967 Oct 16.7	64.99	89.90	6648	210	330	0.009	54
D	Cosmos 182 rocket	1967-98B	1967 Oct 16.33 7.96 days 1967 Oct 24.29	Cylinder 2500?	7.5 long 2.6 dia	1967 Oct 17.1	64.98	89.75	6642	204	324	0.009	45
D	Fragment	1967-98C											
D R?	Cosmos 183	1967-99A	1967 Oct 18.56 0.07 day 1967 Oct 18.63	Cylinder	2 long? 1 dia?	1967 Oct 18.6	49.63	88.90	6601	130	315	0.014	63
D	Cosmos 183 launch platform	1967-99B	1967 Oct 18.56 0.48 day 1967 Oct 19.04	Irregular	-	1967 Oct 18.9	49.66	87.50	6531	127	179	0.004	41
D	Cosmos 183 rocket	1967-99C	1967 Oct 18.56 0.26 day 1967 Oct 18.82	Cylinder 1500?	8 long? 2.5 dia?	1967 Oct 18.7	49.3	88.05	6559	151	211	0.005	-

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	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
	0SO 4	1967-100A	1967 Oct 18.67 25 years	Nonagonal box 272	0.94 long 1.12 dia	1967 Oct 19.5	33.04	95.58	6931	546	560	0.001	140
	0SO 4 rocket	1967-100B	1967 Oct 18.67 14 years	Cylinder 24	1.5 long 0.46 dia	1967 Oct 20.3 1972 Mar 11.3	32.99 32.9	95.58 94.78	6931 6892	539 501	567 526	0.002 0.002	261 -
D	Molniya 1G	1967-101A	1967 Oct 22.36 801 days 1969 Dec 31	Windmill 1000?	3.4 long 1.6 dia	1967 Oct 22.9 1969 Jan 15.8 1969 Sep 8.5	65.00 64.7 64.8	715.0 733.45 732.35	26487 26942 26915	508 471 197	39710 40657 40877	0.740 0.746 0.756	285 - -
D	Molniya 1G launcher	1967-101B	1967 Oct 22.36 15.78 days 1967 Nov 7.14	Irregular	-	1967 Oct 24.7	64.80	90.99	6701	202	443	0.018	63
D	Molniya 1G launcher rocket	1967-101C	1967 Oct 22.36 11.87 days 1967 Nov 3.23	Cylinder 2500?	7.5 long 2.6 dia	1967 Oct 22.7	64.82	90.95	6698	199	440	0.018	58
D	Molniya 1G rocket	1967-101F	1967 Oct 22.36 817 days 1970 Jan 16	Cylinder 440	2.0 long 2.0 dia	1967 Dec 27 1968 Aug 23.5 1969 May 8.5	64.9 64.70 64.73	711.7 711.6 711.6	26406 26405 26405	517 584 414	39539 39470 39640	0.739 0.736 0.743	- - -
D	Fragments	1967-101D,E											
	Cosmos 184	1967-102A	1967 Oct 24.96 30 years	Cylinder + 2 vanes 2000?	5 long? 1.5 dia?	1967 Oct 25.1	81.19	97.09	6997	600	638	0.003	282
	Cosmos 184 rocket	1967-102B	1967 Oct 24.96 40 years	Cylinder 1440	3.8 long 2.6 dia	1967 Oct 25.3	81.20	97.27	7006	544	711	0.012	177
D	[Titan 3B Agena D]	1967-103A	1967 Oct 25.80 9 days 1967 Nov 4	Cylinder 3000?	8 long? 1.5 dia	1967 Oct 26.1	111.57	90.15	6661	136	429	0.022	130
D	Cosmos 185	1967-104A	1967 Oct 27.10 445.61 days 1969 Jan 14.71	Spheroid + paddles	1.5 dia?	1967 Oct 28.4 1968 Mar 28.2 1968 Aug 15.8	64.09 64.0 64.0	98.67 97.46 96.52	7074 7017 6972	518 493 466	873 784 722	0.025 0.021 0.018	47 - -
	Cosmos 185 rocket	1967-104B	1967 Oct 27.10 50 years	Cylinder 1500?	6 long? 2 dia?	1967 Oct 29.5	64.09	98.60	7070	510	874	0.026	47

	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min.)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D	Cosmos 186 *	1967-105A	1967 Oct 27.40	Cylinder +	7.5 long	1967 Oct 27.5	51.67	88.29	6570	172	212	0.003	274
R			3.87 days	2 wings	2.2 dia	1967 Oct 31.0	51.61	88.96	6604	193	253	0.005	57
			1967 Oct 31.27	6480?									
D	Cosmos 186 rocket	1967-105B	1967 Oct 27.40	Cylinder	7.5 long	1967 Oct 27.7	51.67	88.58	6584	199	212	0.001	41
			1.91 days	2500?	2.6 dia								
			1967 Oct 29.31										
D	Cosmos 187	1967-106A	1967 Oct 28.55	Cylinder	2 long?	1967 Oct 28.7	49.63	88.80	6600	143	301	0.012	82
R?			0.07 day		1 dia								
			1967 Oct 28.62										
D	Cosmos 187 launch platform	1967-106B	1967 Oct 28.55	Irregular	-	1967 Oct 28.7	49.63	88.00	6557	139	298	0.012	82
			0.44 day										
			1967 Oct 28.99										
D	Cosmos 187 rocket	1967-106C	1967 Oct 28.55	Cylinder	8 long?	1967 Oct 28.7	49.6	88.23	6568	139	240	0.008	-
			0.3 day	1500?	2.5 dia?								
			1967 Oct 28.8										
D	Cosmos 188 *	1967-107A	1967 Oct 30.34	Cylinder +	7.5 long	1967 Oct 30.5	51.65	88.70	6592	180	247	0.005	96
R			3.03 days	2 wings	2.2 dia								
			1967 Nov 2.37	6480?									
D	Cosmos 188 rocket	1967-107B	1967 Oct 30.34	Cylinder	7.5 long	1967 Oct 31.2	51.64	88.71	6592	185	242	0.004	81
			2.74 days	2500?	2.6 dia								
			1967 Nov 2.08										
	Cosmos 189	1967-108A	1967 Oct 30.75	Cylinder	2 long?	1967 Oct 31.1	74.01	95.53	6923	524	565	0.003	162
			11 years	+ paddles	1 dia?	1970 Nov 7.0	73.99	94.74	6883	488	522	0.002	-
				900?		1976 Feb 16.5	73.99	93.15	6807	420	438	0.001	-
	Cosmos 189 rocket	1967-108B	1967 Oct 30.75	Cylinder	7.4 long	1967 Nov 4.5	74.01	95.77	6935	531	582	0.004	115
			14 years	2200?	2.4 dia	1972 May 1.0	73.99	94.94	6893	497	533	0.003	-
D	Fragments **	1967-108C-L											

* Cosmos 186 and Cosmos 188 docked Oct 30.39 and separated Oct 30.53.

** Fragments designated 1967-108F to 108L possibly belong to the 1972-88, 1973-03 and 1973-10 launches.

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	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D	[Thorad Agena D]	1967-109A	1967 Nov 2.90 29.83 days 1967 Dec 2.73	Cylinder 2000?	8 long? 1.5 dia	1967 Nov 4.9	81.53	90.47	6675	183	410	0.017	168
D	Capsule (Module 283)	1967-109B	1967 Nov 2.90 511.93 days 1969 Mar 28.83	Octagon? 60?	0.3 long? 0.9 dia?	1967 Nov 6.9 1968 Apr 30.5 1968 Oct 15.8	81.68 81.6 81.6	94.41 93.77 93.07	6868 6836 6802	455 431 403	524 485 444	0.005 0.004 0.003	227 - -
D R	Cosmos 190	1967-110A	1967 Nov 3.47 7.80 days 1967 Nov 11.27	Sphere-cylinder 5530?	5 long? 2.4 dia	1967 Nov 3.8	65.73	89.80	6643	191	338	0.011	43
D	Cosmos 190 rocket	1967-110B	1967 Nov 3.47 6.03 days 1967 Nov 9.50	Cylinder 2500?	7.5 long 2.6 dia	1967 Nov 5.8	65.67	89.22	6614	183	289	0.008	31
T	ATS 3	1967-111A	1967 Nov 5.98 > million years	Cylinder 365	1.83 long 1.42 dia	1967 Nov 20.4 1968 Jan 8.0	0.53 0.45	1444.9 1436.8	42339 42172	35791 35776	36130 35812	0.004 0.0004	123 -
D	ATS 3 rocket [Atlas Agena D]	1967-111B	1967 Nov 5.98 276 days 1968 Aug 8	Cylinder 700?	6 long? 1.5 dia	1967 Nov 14.9 1968 Jul 15.8	28.39 28.07	624.5 205.4	24196 11489	179 123	35457 10099	0.729 0.434	186 -
D r	Apollo 4* [Saturn 501]	1967-113A	1967 Nov 9.50 0.36 day 1967 Nov 9.86	Cone-cylinder 30440	10.30 long 3.91 dia	1967 Nov 9.5 1967 Nov 9.7 1967 Nov 9.8	32.7 30.2 30.13	88.08 307.4 319.5	6564 15109 15501	183 60? 80?	188 17402 18326	0.0004 0.571 0.588	- - -
D	LEM Model 1 - Saturn IVB	1967-113B	1967 Nov 9.50 0.34 day 1967 Nov 9.84	Cone-cylinder 29300	24.2 long 6.6 dia	1967 Nov 9.5 1967 Nov 9.7	32.7 30.2	88.08 307.4	6564 15109	183 60?	188 17402	0.0004 0.571	- -
	Essa 6	1967-114A	1967 Nov 10.75 10000 years	Cylinder 132	0.56 long 1.07 dia	1967 Nov 23.0	102.12	114.82	7827	1410	1488	0.005	69
	Essa 6 rocket	1967-114B	1967 Nov 10.75 5000 years	Cylinder 24	1.50 long 0.46 dia	1967 Nov 14.8	102.12	114.83	7828	1411	1489	0.005	88
	Fragments	1967-114C-E											

Space Vehicle: Surveyor 6, 1967-112A, (landed on the Moon, Nov 10.04); also Centaur 15, 1967-112B, in highly eccentric orbit.

* Before Nov 9.63, 1967-113A and B were joined.

	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D	Cosmos 191	1967-115A	1967 Nov 21.60 102.37 days 1968 Mar 2.97	Ellipsoid 400?	1.8 long 1.2 dia	1967 Nov 22.3 1968 Feb 7.8	70.96 70.96	92.16 90.47	6760 6676	267 235	497 360	0.017 0.009	84 -
D	Cosmos 191 rocket	1967-115B	1967 Nov 21.60 53.42 days 1968 Jan 14.02	Cylinder 1500?	8 long 1.65 dia	1967 Nov 22.3 1967 Dec 23.5	70.97 70.97	91.95 90.96	6749 6700	270 258	472 386	0.015 0.010	84 -
	Cosmos 192	1967-116A	1967 Nov 23.62 80 years	Cylinder + boom? 750?	1.4 long? 2.0 dia?	1967 Nov 23.9	73.98	99.85	7132	747	761	0.001	179
	Cosmos 192 rocket	1967-116B	1967 Nov 23.62 80 years	Cylinder 2200?	7.4 long 2.4 dia	1967 Nov 25.4	74.01	99.84	7131	746	760	0.001	260
D R	Cosmos 193	1967-117A	1967 Nov 25.48 7.74 days 1967 Dec 3.22	Sphere-cylinder 5530?	5 long? 2.4 dia	1967 Nov 25.8	65.63	89.85	6647	202	335	0.010	52
D	Cosmos 193 rocket	1967-117B	1967 Nov 25.48 6.18 days 1967 Dec 1.66	Cylinder 2500?	7.5 long 2.6 dia	1967 Nov 27.3	65.64	89.50	6628	184	316	0.010	39
D	*RESAT* [SPARTA]	1967-118A	1967 Nov 29.20 42.28 days 1968 Jan 10.48	Cone 73 (payload 45)	2.2 long 0.76 dia	1967 Nov 29.2 1967 Dec 23.5	83.35 83.2	99.27 95.24	7104 6908	193 167	1259 893	0.075 0.053	340 -
D R	Cosmos 194	1967-119A	1967 Dec 3.50 7.78 days 1967 Dec 11.28	Sphere-cylinder 5530?	5 long? 2.4 dia	1967 Dec 3.7	65.66	89.55	6632	201	307	0.008	39
D P	Cosmos 194 rocket	1967-119B	1967 Dec 3.50 6.12 days 1967 Dec 9.62	Cylinder 2500?	7.5 long 2.6 dia	1967 Dec 3.8	65.65	89.55	6632	201	307	0.008	48

*Weapons Research Establishment Satellite (Australia).

Continued on page 154

	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D	OV3-6 (Atcos 2)*	1967-120A	1967 Dec 5.04 460.14 days 1969 Mar 9.18	Octagonal-cylinder 95	0.53 long 0.73 dia	1967 Dec 7.2 1968 Apr 30.5 1968 Sep 30.5	90.67 90.6 90.6	93.14 92.58 91.99	6804 6777 6748	412 384 358	439 413 381	0.002 0.002 0.002	242 - -
D	OV3-6 rocket	1967-120B	1967 Dec 5.04 125.40 days 1968 Apr 8.44	Cylinder 24	1.50 long 0.46 dia	1967 Dec 15.5 1968 Feb 22.5	90.6 90.6	93.02 92.07	6798 6752	404 364	436 383	0.002 0.001	- -
D	Fragments	1967-120C-E											
D	[Titan 3B Agena D]	1967-121A	1967 Dec 5.78 11.18 days 1967 Dec 16.96	Cylinder 3000?	8 long? 1.5 dia	1967 Dec 7.8	109.55	90.16	6662	137	430	0.022	138
D	[Thorad Agena D]	1967-122A	1967 Dec 9.93 15 days 1967 Dec 25	Cylinder 1350	8 long? 1.5 dia	1967 Dec 10.5 1967 Dec 22.7	81.65 81.74	88.45 88.46	6576 6577	158 146	237 251	0.006 0.008	165 132
D	TTS 1**	1967-123B	1967 Dec 13.59 137.4 days 1968 Apr 29.0	Octahedron 20	0.27 side	1967 Dec 14.9 1968 Mar 8.0	32.90 32.90	92.18 90.99	6767 6708	287 271	490 388	0.015 0.009	71 -
D	Pioneer 8 second stage	1967-123C	1967 Dec 13.59 110.0 days 1968 Apr 1.6	Cylinder 400?	4.9 long 1.43 dia	1967 Dec 19.4 1968 Feb 22.5	32.91 32.85	92.15 90.94	6765 6705	293 272	479 382	0.014 0.008	117 -
D	Fragments	1967-123D,E											
D R	Cosmos 195	1967-124A	1967 Dec 16.50 7.76 days 1967 Dec 24.26	Sphere-cylinder 5530?	5 long? 2.4 dia	1967 Dec 16.7	65.65	90.10	6658	207	353	0.011	59
D	Cosmos 195 rocket	1967-124B	1967 Dec 16.50 7.31 days 1967 Dec 23.81	Cylinder 2500?	7.5 long 2.6 dia	1967 Dec 18.1	65.64	89.76	6642	197	330	0.010	47
D	Fragment	1967-124C											

Space Vehicle: Pioneer 8, 1967-123A, and Altair rocket, 1967-123F?

* Atmospheric composition satellite.

** Test and Training Satellite.

	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D	Cosmos 196	1967-125A	1967 Dec 19.27 202.85 days 1968 Jul 7.12	Ellipsoid 400?	1.8 long 1.2 dia	1967 Dec 21.7 1968 Feb 29.8	48.80 48.73	95.42 94.09	6920 6854	223 217	860 735	0.046 0.038	117 -
D	Cosmos 196 rocket	1967-125B	1967 Dec 19.27 63.54 days 1968 Feb 20.81	Cylinder 1500?	8 long 1.65 dia	1967 Dec 22.6 1968 Feb 7.5	48.81 48.77	95.20 91.86	6908 6749	219 200	841 542	0.045 0.025	119 -
D	Fragments	1967-125C-E											
D	Cosmos 197	1967-126A	1967 Dec 26.38 34.80 days 1968 Jan 30.18	Ellipsoid 400?	1.8 long 1.2 dia	1967 Dec 26.6	48.42	91.51	6730	217	486	0.020	95
D	Cosmos 197 rocket	1967-126B	1967 Dec 26.38 12.80 days 1968 Jan 8.18	Cylinder* 1500?	8 long* 1.65 dia	1967 Dec 26.6	48.44	91.40	6724	218	473	0.019	99
D	Fragments	1967-126C-J											
	Cosmos 198**	1967-127A	1967 Dec 27.48 500 years	Cone-cylinder	6 long? 2 dia?	1967 Dec 27.5 1967 Dec 29.7	65.14 65.15	89.70 103.43	6638 7301	249 894	270 952	0.002 0.004	275 307
D	Cosmos 198 platform	1967-127B	1967 Dec 27.48 24.74 days 1968 Jan 21.22	Irregular	-	1967 Dec 27.5	65.10	89.63	6635	241	273	0.002	305
D	Cosmos 198 rocket	1967-127C	1967 Dec 27.48 3.99 days 1967 Dec 31.47	Cylinder 1500?	8 long? 2.5 dia?	1967 Dec 30.1	65.09	89.12	6610	224	239	0.001	224

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* Before explosion.

** 1967-127B and 127C attached to 1967-127A until orbit change.

	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
T L	Explorer 36 (Geos-2)	1968-02A	1968 Jan 11.68 10000 years	Octahedron + pyramid 209	0.81 high 1.22 dia	1968 Jan 12.0	105.80	112.28	7709	1084	1577	0.032	168
	Explorer 36 rocket	1968-02B	1968 Jan 11.68 5000 years	Cylinder 24	1.5 long 0.46 dia	1968 Jan 18.8	105.79	112.22	7706	1083	1573	0.032	157
	Fragments	1968-02C,D											
D	Cosmos 199 rocket	1968-03B	1968 Jan 16.50 9.4 days 1968 Jan 25.9	Cylinder 1st 2 days 8000? then 2500?	7.5 long* 2.6 dia	1968 Jan 17.4	65.64	90.11	6660	202	362	0.012	55
D	Cosmos 199	1968-03A	1968 Jan 16.50 16.49 days 1968 Feb 1.99	Sphere- cylinder** 5530?	5 long?** 2.4 dia	1968 Jan 20.2	65.63	90.15	6662	204	364	0.012	59
D	Cosmos 199 transmitter***	1968-03C	1968 Jan 16.50 13.9 days 1968 Jan 30.4	Sphere 2500?	2.4 dia	1968 Jan 25.3	65.67	88.36	6573	149	241	0.007	354
D	Fragment	1968-03D											
D	[Thor Agena D]	1968-04A	1968 Jan 17.42 902.32 days 1970 Jul 7.74	Cylinder 1500?	8 long? 1.5 dia	1968 Jan 19.8 1969 Feb 15.3 1969 Oct 16.3	75.16 75.1 75.1	94.53 93.80 93.10	6876 6842 6804	450 436 408	546 491 444	0.007 0.004 0.003	218 - -
D	Fragments	1968-04B,C											
D	[Titan 3B Agena D]	1968-05A	1968 Jan 18.79 17.13 days 1968 Feb 4.92	Cylinder 3000?	8 long? 1.5 dia	1968 Jan 19.5 1968 Feb 4.8	111.52 111.53	89.91 89.58	6649 6632	138 130	404 377	0.020 0.019	128 113
D	Cosmos 200	1968-06A	1968 Jan 19.92 1862.56 days 1973 Feb 24.48	Cylinder + paddles? 900?	2 long? 1 dia?	1968 Jan 20.3 1969 Oct 31.7 1971 Dec 1.0	74.03 74.03 74.03	95.23 94.56 93.12	6908 6875 6806	523 490 425	537 503 430	0.001 0.001 0.0004	337 - -
D	Cosmos 200 rocket	1968-06B	1968 Jan 19.92 1476.38 days 1972 Feb 4.30	Cylinder 2200?	7.4 long 2.4 dia	1968 Jan 21.8 1969 Oct 31.7 1970 Dec 1.3	74.01 74.01 74.01	95.02 94.23 93.05	6898 6858 6802	499 465 413	540 495 435	0.003 0.002 0.002	16 - -
Sd	Fragments	1968-06C-H											

Space Vehicle: Surveyor 7, 1968-01A;
Centaur rocket, 1968-01B, in highly eccentric orbit.

* After Jan 19.0. Before Jan 19.0, 1968-03A, B and C were joined.
** Before explosion on Jan 24.3.
*** Part of 1968-03A before Jan 24.3.

	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D	LEM 1 Ascent Stage*	1968-07A	1968 Jan 22.95 1 day 1968 Jan 24	Box + 2 tanks 2200 empty	2.52 high 3.76 wide 3.13 deep			Orbit similar to 1968-07C					
D	Apollo 5 LEM 1 Descent Stage*	1968-07B	1968 Jan 22.95 20.79 days 1968 Feb 12.74	Octagon + cone + 4 legs 1650 empty	1.57 high 3.13 wide	1968 Jan 27.1	31.63	89.65	6641	170	356	0.014	152
D	Saturn IV B [Saturn 204]	1968-07C	1968 Jan 22.95 0.69 day 1968 Jan 23.64	Cylinder 12500?	18.7 long 6.6 dia	1968 Jan 23.2	31.64	88.11	6566	162	214	0.004	62
D	[Thorad Agena D]	1968-08A	1968 Jan 24.93 33.54 days 1968 Feb 27.47	Cylinder 2000?	8 long? 1.5 dia	1968 Jan 26.8 1968 Feb 26.4	81.48 81.47	90.55 88.44	6681 6574	176 158	430 234	0.019 0.006	168 52
D	Capsule**	1968-08B	1968 Jan 24.93 769.76 days 1970 Mar 4.69	Octagon? 60?	0.3 long? 0.9 dia?	1968 Jan 28.5 1969 Feb 15.3 1969 Oct 31.7	81.65 81.6 81.6	94.75 93.85 92.59	6886 6841 6778	473 439 386	542 487 414	0.005 0.003 0.002	216 - -
D	Fragment	1968-08C											
D R	Cosmos 201	1968-09A	1968 Feb 6.33 7.93 days 1968 Feb 14.26	Sphere-cylinder 5530?	5 long? 2.4 dia	1968 Feb 6.4	64.91	89.91	6649	204	337	0.010	54
D	Cosmos 201 rocket	1968-09B	1968 Feb 6.33 7.53 days 1968 Feb 13.86	Cylinder 2500?	7.5 long 2.6 dia	1968 Feb 6.6	64.96	89.75	6642	204	324	0.009	52

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*Before Jan 23.15, 1968-07A and B were joined. Lunar Excursion Module.
**1968-08B separated from 1968-08A on Jan 25.01.

	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D	Cosmos 202	1968-10A	1968 Feb 20.42 32.62 days 1968 Mar 24.04	Ellipsoid 400?	1.8 long 1.2 dia	1968 Feb 21.5	48.44	91.42	6726	213	482	0.020	99
D	Cosmos 202 rocket	1968-10B	1968 Feb 20.42 12.62 days 1968 Mar 4.04	Cylinder 1500?	8 long 1.65 dia	1968 Feb 21.3	48.45	91.41	6725	212	481	0.020	102
	Cosmos 203	1968-11A	1968 Feb 20.67 3000 years	Spheroid + 2 vanes? 650?	1.6 dia?	1968 Feb 21.0	74.06	109.22	7571	1178	1208	0.002	230
	Cosmos 203 rocket	1968-11B	1968 Feb 20.67 2000 years	Cylinder 2200?	7.4 long 2.4 dia	1968 Feb 26.4	74.06	109.31	7575	1189	1204	0.001	232
	Fragment	1968-11C											
	Transit 18 [Scout]	1968-12A	1968 Mar 2.16 1000 years	Octagon + 4 vanes 60?	0.25 long 0.46 dia	1968 Mar 4.2	89.99	107.00	7465	1035	1139	0.007	230
	Altair rocket	1968-12B	1968 Mar 2.16 1000 years	Cylinder 24	1.5 long 0.46 dia	1968 Mar 6.1	90.00	107.00	7465	1029	1144	0.008	223
	Fragments	1968-12C,D											
D	Zond 4 launcher rocket	1968-13B	1968 Mar 2.77 4 days 1968 Mar 7	Cylinder 4000?	12 long? 4 dia	1968 Mar 4.8	51.53	88.41	6577	192	205	0.001	30
D	Fragments	1968-13C,D											
	OGO 5	1968-14A	1968 Mar 4.55 100 years?	Box + 6 booms 611	1.73 long 0.84 high 0.84 wide	1968 Mar 4.6 1969 Jan 31.3 1971 Jun 1.0	31.13 43.80 54.0	3795.9 3745.7 3745.7	80608 79890 79896	232 6045 27008	148228 140978 120027	0.918 0.845 0.582	314 337 -
	OGO 5 rocket	1968-14B	1968 Mar 4.55 100 years?	Cylinder 700?	8 long 1.5 dia	Orbit similar to 1968-14A							

Space Vehicle: Zond 4, 1968-13A.

	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D	Cosmos 204	1968-15A	1968 Mar 5.47 362.45 days 1969 Mar 2.92	Ellipsoid 400?	1.8 long 1.2 dia	1968 Mar 6.1 1968 Jun 30.5 1968 Oct 31.2	70.99 70.9 70.9	95.81 94.81 93.22	6938 6886 6812	275 262 253	844 754 614	0.041 0.036 0.027	80 - -
D	Cosmos 204 rocket	1968-15B	1968 Mar 5.47 222.11 days 1968 Oct 13.58	Cylinder 1500?	8 long 1.65 dia	1968 Mar 6.3 1968 Jun 30.5	71.01 70.9	95.70 93.85	6932 6841	277 258	831 668	0.040 0.030	80 -
D R	Cosmos 205	1968-16A	1968 Mar 5.52 7.76 days 1968 Mar 13.28	Sphere-cylinder 5530?	5 long? 2.4 dia	1968 Mar 5.7	65.66	89.40	6624	199	282	0.007	45
D	Cosmos 205 rocket	1968-16B	1968 Mar 5.52 4.32 days 1968 Mar 9.84	Cylinder 2500?	7.5 long 2.6 dia	1968 Mar 6.1	65.66	89.22	6614	190	282	0.007	30
	Explorer 37 (SR-9)	1968-17A	1968 Mar 5.77 40 years	Dodecahedron 90	0.69 high 0.76 dia	1968 Mar 6.3	59.43	98.68	7075	513	831	0.026	274
	Explorer 37 rocket	1968-17B	1968 Mar 5.77 20 years	Cylinder 24	1.5 long 0.46 dia	1968 Mar 10.3 1972 Jan 16.5	59.42 59.42	98.70 97.72	7076 7027	514 500	882 796	0.026 0.021	278 -
2c	Fragments	1968-17C-E											
D	[Titan 3B Agena D]	1968-18A	1968 Mar 13.83 11 days 1968 Mar 24	Cylinder 3000?	8 long? 1.5 dia	1968 Mar 15.7 1968 Mar 23.1	99.87 99.88	89.87 88.92	6646 6598	128 131	407 309	0.021 0.013	134 106
	Cosmos 206	1968-19A	1968 Mar 14.40 25 years	Cylinder + 2 vanes 2000?	5 long? 1.5 dia?	1968 Mar 26.1	81.23	97.08	6997	598	640	0.003	232
	Cosmos 206 rocket	1968-19B	1968 Mar 14.40 30 years	Cylinder 1440	3.8 long 2.6 dia	1968 Mar 26.3	81.23	97.28	7006	544	712	0.012	144

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	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D	[Thorad Agena D]	1968-20A	1968 Mar 14.92 26.22 days 1968 Apr 10.14	Cylinder 2000?	8 long? 1.5 dia	1968 Mar 15.6 1968 Apr 8.1	83.01 82.91	90.20 89.09	6663 6606	178 188	391 268	0.016 0.006	168 64
D	Capsule*	1968-20B	1968 Mar 14.92 659.85 days 1970 Jan 3.77	Octagon? 60?	0.3 long? 0.9 dia?	1968 Mar 17.8 1969 Feb 15.3 1969 Sep 16.0	83.09 83.0 83.0	94.66 93.81 92.58	6880 6839 6778	481 445 389	522 476 410	0.003 0.002 0.002	265 - -
D R	Cosmos 207	1968-21A	1968 Mar 16.52 7.79 days 1968 Mar 24.31	Sphere-cylinder 5530?	5 long? 2.4 dia	1968 Mar 17.5	65.64	89.71	6639	201	321	0.009	51
D	Cosmos 207 rocket	1968-21B	1968 Mar 16.52 6.22 days 1968 Mar 22.74	Cylinder 2500?	7.5 long 2.6 dia	1968 Mar 17.8	65.61	89.55	6632	207	300	0.007	42
D R	Cosmos 208	1968-22A	1968 Mar 21.41 11.85 days 1968 Apr 2.26	Sphere-cylinder 5900?	5.9 long 2.4 dia	1968 Mar 23.1	64.95	89.35	6619	208	274	0.005	32
D	Cosmos 208 rocket	1968-22B	1968 Mar 21.41 4.32 days 1968 Mar 25.73	Cylinder 2500?	7.5 long 2.6 dia	1968 Mar 22.5	64.97	89.15	6611	200	266	0.005	34
D	Gamma Flux package**	1968-22C	1968 Mar 21.41 16 days 1968 Apr 6	Ellipsoid 200?	0.9 long 1.9 dia	1968 Mar 30.6	64.95	89.09	6608	196	264	0.005	37

*1968-20B separated from 1968-20A on Mar 14.99.
**1968-22C separated from 1968-22A about Mar 29.3.

	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
	Cosmos 209*	1968-23A	1968 Mar 22.40 500 years	Cone-cylinder?	6 long? 2 dia?	1968 Mar 22.5 1968 Mar 28.6	65.04 65.33	89.74 103.13	6641 7286	183 871	343 944	0.012 0.005	317 270
D	Cosmos 209 rocket	1968-23B	1968 Mar 22.40 3.43 days 1968 Mar 25.83	Cylinder 1500?	8 long? 2.5 dia?	1968 Mar 24.9	65.09	88.95	6601	210	236	0.002	244
D	Cosmos 209 platform	1968-23C	1968 Mar 22.40 19.25 days 1968 Apr 10.65	Irregular	-	1968 Mar 25.6	65.09	89.46	6625	227	267	0.003	279
D	Fragments	1968-23D,E											
D R	Cosmos 210	1968-24A	1968 Apr 3.46 7.84 days 1968 Apr 11.30	Sphere-cylinder 5530?	5 long? 2.4 dia	1968 Apr 3.8	81.39	90.27	6665	200	373	0.013	85
D	Cosmos 210 rocket	1968-24B	1968 Apr 3.46 8.75 days 1968 Apr 12.21	Cylinder 2500?	7.5 long 2.6 dia	1968 Apr 4.2	81.39	90.11	6658	200	360	0.012	82
D	Fragment	1968-24C											
D r	Apollo 6** Command module + Service module	1968-25A	1968 Apr 4.50 0.42 day 1968 Apr 4.92	Cone-cylinder 25000	10.36 long 3.91 dia	1968 Apr 4.5 1968 Apr 4.7	32.57 30.13	90.36 385.20	6676 17560	205 90?	392 222?4	0.014 0.632	121 -
D	LEM Model 2 - Saturn IV B [Saturn 502]	1968-25B	1968 Apr 4.50 22.01 days 1968 Apr 26.51	Cylinder 24300?	24.2 long? 6.6 dia	1968 Apr 7.1 1968 Apr 14.1	32.59 32.54	90.17 89.69	6667 6644	200 189	378 342	0.013 0.011	149 231
D	Fragments	1968-25C-G											

*1968-23B and 23C attached to 1968-23A until orbit change.

**Before Apr 4.64, 1968-25A and B were joined.

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	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
	OV1-13	1968-26A	1968 Apr 6.42 1000 years	Cylinder + hemisphere 107	1.40 long 0.69 dia	1968 Apr 6.6	100.05	109.72	11315	558	9316	0.387	184
	OV1-14	1968-26B	1968 Apr 6.42 1000 years	Cylinder + hemisphere 101	1.40 long 0.69 dia	1968 Apr 6.6	100.04	208.03	11620	571	9913	0.402	184
	OV1-14 rocket	1968-26C	1968 Apr 6.42 500 years	Cylinder 70?	2.05 long 0.72 dia	1968 Apr 6.6	100.04	208.4	11634	560	9957	0.404	-
	OV1-13 rocket	1968-26D	1968 Apr 6.42 500 years	Cylinder 70?	2.05 long 0.72 dia	1968 Apr 6.6	100.05	109.71	11315	553	9320	0.387	-
D	Luna 14 launcher	1968-27B	1968 Apr 7.42 2.39 days 1968 Apr 9.81	-	-	1968 Apr 7.5	51.78	88.78	6594	189	242	0.004	62
D	Luna 14 launcher rocket	1968-27C	1968 Apr 7.42 1.78 days 1968 Apr 9.20	Cylinder 2500?	7.5 long 2.6 dia	1968 Apr 7.6	51.79	88.67	6588	183	236	0.004	34
D	Cosmos 211	1968-28A	1968 Apr 9.48 214.74 days 1968 Nov 10.22	Ellipsoid 400?	1.8 long 1.2 dia	1968 Apr 9.5 1968 Jun 15.5 1968 Aug 31.2	81.90 81.8 81.8	102.27 99.93 96.38	7244 7133 6963	199 197 191	1532 1313 979	0.092 0.078 0.057	74 - -
D	Cosmos 211 rocket	1968-28B	1968 Apr 9.48 130.51 days 1968 Aug 17.99	Cylinder 1500?	8 long 1.65 dia	1968 Apr 9.5 1968 Jun 15.5	81.90 81.77	102.27 98.35	7244 7059	199 191	1532 1171	0.092 0.069	74 -

Space Vehicle: 1968-27A, Luna 14.

	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D	Cosmos 212*	1968-29A	1968 Apr 14.42	Cylinder	7.5 long	1968 Apr 14.5	51.84	88.55	6584	186	225	0.003	152
R			4.92 days	+ 2 wings	2.2 dia	1968 Apr 15.2	51.66	88.25	6569	184	197	0.001	300
			1968 Apr 19.34	6500?		1968 Apr 18.6	51.60	88.72	6592	174	253	0.006	80
D	Cosmos 212 rocket	1968-29B	1968 Apr 14.42 2.17 days 1968 Apr 16.59	Cylinder 2500?	7.5 long 2.6 dia	1968 Apr 14.8	51.68	88.52	6583	203	207	0.0003	45
D	Cosmos 213*	1968-30A	1968 Apr 15.40	Cylinder	7.5 long	1968 Apr 15.5	51.66	88.88	6599	188	254	0.005	116
R			5.01 days	+ 2 wings	2.2 dia	1968 Apr 16.8	51.67	89.02	6606	195	261	0.005	90
			1968 Apr 20.41	6500?		1968 Apr 19.0	51.65	89.12	6611	193	272	0.006	90
D	Cosmos 213 rocket	1968-30B	1968 Apr 15.40 3.65 days 1968 Apr 19.05	Cylinder 2500?	7.5 long 2.6 dia	1968 Apr 16.7	51.65	88.86	6598	193	246	0.004	97
D	[Titan 3B Agena D]	1968-31A	1968 Apr 17.71	Cylinder	8 long?	1968 Apr 18.4	111.51	90.10	6659	134	427	0.022	125
			12 days	3000?	1.5 dia	1968 Apr 22.0	111.49	90.19	6663	132	438	0.023	119
			1968 Apr 29			1968 Apr 24.7	111.49	89.75	6641	130	396	0.020	115
D	Cosmos 214	1968-32A	1968 Apr 18.44	Sphere-cylinder	5 long?	1968 Apr 19.1	81.40	90.25	6665	200	373	0.013	84
R			7.96 days	5530?	2.4 dia								
			1968 Apr 26.40										
D	Cosmos 214 rocket	1968-32B	1968 Apr 18.44 11.47 days 1968 Apr 29.91	Cylinder 2500?	7.5 long 2.6 dia	1968 Apr 19.1	81.44	90.05	6657	186	372	0.014	81
D	Cosmos 215	1968-33A	1968 Apr 18.94	Ellipsoid	1.8 long	1968 Apr 24.1	48.41	91.03	6707	255	403	0.011	134
			72.92 days	400?	1.2 dia	1968 May 23.5	48.41	90.46	6679	238	363	0.009	-
			1968 Jun 30.86										
D	Cosmos 215 rocket	1968-33B	1968 Apr 18.94 30.58 days 1968 May 19.52	Cylinder 1500?	8 long 1.65 dia	1968 Apr 21.9	48.41	90.94	6703	258	332	0.010	129

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*Cosmos 212 and Cosmos 213 docked Apr 15.43 and separated Apr 15.59.

	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D R	Cosmos 216	1968-34A	1968 Apr 20.44 7.98 days 1968 Apr 28.42	Sphere-cylinder 5530?	5 long? 2.4 dia	1968 Apr 20.7	51.84	89.12	6612	201	267	0.005	21
D	Cosmos 216 rocket	1968-34B	1968 Apr 20.44 2.95 days 1968 Apr 23.39	Cylinder 2500?	7.5 long 2.6 dia	1968 Apr 21.0	51.83	88.95	6603	185	264	0.006	19
D	Molniya 1H	1968-35A	1968 Apr 21.18 2109 days 1974 Jan 29	Windmill 1000?	3.4 long 1.6 dia	1968 Apr 29.2 1969 Feb 15.3 1971 Jan 16.5	64.85 65.2 65.3	713.12 717.73 717.69	26443 26555 26554	391 833 1531	39738 39521 38821	0.744 0.729 0.702	285 - -
D	Molniya 1H launcher	1968-35C	1968 Apr 21.18 38.45 days 1968 May 29.63	Irregular	-	1968 Apr 22.5	64.91	91.54	6730	244	460	0.016	66
D	Molniya 1H launcher rocket	1968-35B	1968 Apr 21.18 20.11 days 1968 May 11.29	Cylinder 2500?	7.5 long 2.6 dia	1968 Apr 23.7	64.97	90.69	6689	231	391	0.012	53
D	Molniya 1H rocket	1968-35D	1968 Apr 21.18 2270.77 days 1974 Jul 9.95	Cylinder 440	2.0 long 2.0 dia	1968 Nov 17.1 1969 Oct 1.0 1971 Feb 1.0	65.11 65.11 65.11	709.39 709.29 709.25	26349 26346 26345	680 1159 1616	39261 38777 38318	0.732 0.714 0.687	282 - -
D	Cosmos 217*	1968-36A	1968 Apr 24.67 2 days 1968 Apr 26	Cylinder?	10 long? 2.5 dia?	1968 Apr 24.8 1968 Apr 25.3	62.24 62.26	88.50 87.65	6581 6538	144 140	262 179	0.009 0.003	74 96
D R?	Cosmos 218	1968-37A	1968 Apr 25.03 0.07 day 1968 Apr 25.10	Cylinder	2 long? 1 dia?	1968 Apr 25.0	49.56	87.28	6521	123	162	0.003	23
D	Cosmos 218 rocket	1968-37B	1968 Apr 25.03 0.23 day 1968 Apr 25.26	Cylinder 1500?	8 long? 2.5 dia?	1968 Apr 25.1	49.59	87.42	6528	131	167	0.003	42
D	Cosmos 218 launch platform	1968-37C	1968 Apr 25.03 0.45 day 1968 Apr 25.48	Irregular	-	1968 Apr 25.3	49.60	87.48	6531	133	172	0.003	67

* Intended orbit announced by USSR: 62.2 deg, 93.4 min, 396-520 km height.

	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D	Cosmos 219	1968-38A	1968 Apr 26.20 310.10 days 1969 Mar 2.30	Ellipsoid 400?	1.8 long 1.2 dia	1968 Apr 26.3 1968 Jul 31.2 1968 Dec 8.0	48.42 48.42 48.35	104.62 102.28 96.83	7358 7248 6988	215 213 203	1745 1526 1017	0.104 0.091 0.058	100 - -
D	Cosmos 219 rocket	1968-38B	1968 Apr 26.20 304.18 days 1969 Feb 24.38	Cylinder 1500?	8 long 1.65 dia	1968 Apr 26.3 1968 Jul 31.2 1968 Dec 8.0	48.42 48.42 48.42	104.38 102.04 96.82	7347 7237 6988	219 228 216	1718 1489 1003	0.102 0.087 0.056	100 - -
D	Fragment	1968-38C											
D r?	[Thorad Agena D]*	1968-39A	1968 May 1.90 14 days 1968 May 15	Cylinder 2000?	8 long? 1.5 dia	1968 May 2.8 1968 May 15.4	83.05 83.05	88.58 88.63	6582 6583	164 155	243 255	0.006 0.008	163 139
D	Agena D rocket*	1968-39B	1968 May 1.90 18.79 days 1968 May 20.69	Cylinder 700?	6 long? 1.5 dia	1968 May 17.0 1968 May 20.6	83.02 83.01	88.64 87.48	6584 6526	154 132	257 164	0.008 0.002	147 145
	Cosmos 220	1968-40A	1968 May 7.58 50 years	Cylinder + boom? 750?	1.4 long? 2.0 dia?	1968 May 7.7	74.10	99.15	7096	675	760	0.006	10
	Cosmos 220 rocket	1968-40B	1968 May 7.58 50 years	Cylinder 2200?	7.4 long 2.4 dia	1968 May 18.7	74.05	99.17	7097	678	759	0.006	352
	Fragment	1968-40C											
D	Iris** (ESRO 2)†	1968-41A	1968 May 17.09 1086.05 days 1971 May 8.14	12-sided cylinder 75	0.85 long 0.76 dia	1968 May 18.8 1969 Jun 16.0 1970 Aug 1.0	97.16 97.16 97.16	99.00 97.37 94.70	7088 7009 6881	334 325 308	1085 937 697	0.053 0.044 0.028	161 - -
D	Iris rocket	1968-41B	1968 May 17.09 682.83 days 1970 Mar 30.92	Cylinder 24	1.50 long 0.46 dia	1968 Jun 11.4 1969 Feb 15.3 1969 Oct 31.7	97.21 97.17 97.17	98.85 97.29 94.68	7080 7005 6880	331 323 311	1073 931 692	0.052 0.043 0.028	85 - -
D	Fragment	1968-41C											
	[Thor Burner 2]	1968-42A	1968 May 23.19 100 years	12-sided frustum 195	1.64 long 1.31 to 1.10 dia	1968 May 24.6	98.94	102.19	7239	817	904	0.006	59
	Burner 2 rocket	1968-42B	1968 May 23.19 80 years	Sphere-cone 66	1.32 long 0.94 dia	1968 Jun 14.7	98.88	102.21	7240	819	904	0.006	13

*Before May 15, 1968-39B was part of 1968-39A.

**Infra-red interferometer spectrometer

†European Space Research Organisation.

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	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D	Cosmos 221	1968-43A	1968 May 24.30 463.84 days 1969 Aug 31.14	Ellipsoid 400?	1.8 long 1.2 dia	1968 May 25.0 1968 Oct 15.8 1969 Feb 15.3	48.41 48.41 48.37	108.30 105.13 101.15	7530 7382 7195	218 211 206	2086 1797 1428	0.124 0.107 0.085	103 - -
D	Cosmos 221 rocket	1968-43B	1968 May 24.30 324.29 days 1969 Apr 13.59	Cylinder 1500?	8 long 1.65 dia	1968 May 27.0 1968 Oct 31.2 1969 Feb 15.3	48.40 48.37 48.37	107.94 102.57 96.92	7513 7261 6993	218 213 205	2051 1553 1024	0.122 0.092 0.059	110 - -
D	Cosmos 222	1968-44A	1968 May 30.85 134 days 1968 Oct 11	Ellipsoid 400?	1.8 long 1.2 dia	1968 May 31.0 1968 Jul 31.2	70.91 70.91	92.28 91.44	6765 6725	285 255	488 438	0.015 0.014	95 -
D	Cosmos 222 rocket	1968-44B	1968 May 30.85 74.53 days 1968 Aug 13.38	Cylinder 1500?	8 long 1.65 dia	1968 May 31.0 1968 Jun 30.5	70.91 70.91	92.00 91.37	6752 6721	273 263	475 422	0.015 0.012	95 -
D R	Cosmos 223	1968-45A	1968 Jun 1.46 7.80 days 1968 Jun 9.26	Sphere-cylinder 5530?	5 long? 2.4 dia	1968 Jun 5.8	72.86	89.85	6645	200	333	0.010	45
D	Cosmos 223 rocket	1968-45B	1968 Jun 1.46 7.97 days 1968 Jun 9.43	Cylinder 2500?	7.5 long 2.6 dia	1968 Jun 2.8	72.86	89.72	6639	201	321	0.009	44
D R	Cosmos 224	1968-46A	1968 Jun 4.28 7.98 days 1968 Jun 12.26	Sphere-cylinder 5530?	5 long? 2.4 dia	1968 Jun 4.6	51.83	89.05	6608	203	256	0.004	31
D	Cosmos 224 rocket	1968-46B	1968 Jun 4.28 3.13 days 1968 Jun 7.41	Cylinder 2500?	7.5 long 2.6 dia	1968 Jun 4.6	51.82	88.85	6598	193	246	0.004	20
D	[Titan 3B Agena D]	1968-47A	1968 Jun 5.73 12.2 days 1968 Jun 17.9	Cylinder 3000?	8 long? 1.5 dia	1968 Jun 5.9 1968 Jun 17.1	110.52 110.52	90.31 89.51	6668 6629	123 122	456 381	0.025 0.020	118 110
D	Cosmos 225	1968-48A	1968 Jun 11.90 144 days 1968 Nov 2	Ellipsoid 400?	1.8 long 1.2 dia	1968 Jun 12.8 1968 Aug 31.0	48.40 48.36	92.15 91.31	6762 6721	255 246	512 439	0.019 0.014	118 -
D	Cosmos 225 rocket	1968-48B	1968 Jun 11.90 64.23 days 1968 Aug 15.13	Cylinder 1500?	8 long 1.65 dia	1968 Jun 12.7 1968 Jul 15.8	48.42 48.42	91.90 91.18	6750 6714	257 245	486 427	0.017 0.014	123 -
D	Fragments	1968-48C,D											

Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
Cosmos 226	1968-49A	1968 Jun 12.55 25 years	Cylinder + 2 vanes 2000?	5 long? 1.5 dia?	1968 Jul 23.5	81.24	96.87	6987	579	639	0.004	-
Cosmos 226 rocket	1968-49B	1968 Jun 12.55 30 years	Cylinder 1440	3.8 long 2.6 dia	1968 Jul 23.5	81.25	97.10	6998	526	713	0.013	-
IDCSP 4-1	1968-50A	1968 Jun 13.59 > million yr	Polyhedron (26 faces) 45	0.8 long 0.9 dia	1968 Jun 15.4	0.19	1335.7	40178	33758	33841	0.001	153
IDCSP 4-2	1968-50B	1968 Jun 13.59 > million yr	Polyhedron (26 faces) 45	0.8 long 0.9 dia	1968 Jun 15.4	0.11	1335.5	40172	33725	33863	0.002	125
IDCSP 4-3	1968-50C	1968 Jun 13.59 > million yr	Polyhedron (26 faces) 45	0.8 long 0.9 dia	1968 Jun 15.5	0.10	1335.9	40181	33699	33907	0.003	123
IDCSP 4-4	1968-50D	1968 Jun 13.59 > million yr	Polyhedron (26 faces) 45	0.8 long 0.9 dia	1968 Jun 15.6	0.10	1338.0	40224	33737	33954	0.003	127
IDCSP 4-5	1968-50E	1968 Jun 13.59 > million yr	Polyhedron (26 faces) 45	0.8 long 0.9 dia	1968 Jun 15.4	0.19	1339.6	40256	33721	34035	0.004	121
IDCSP 4-6	1968-50F	1968 Jun 13.59 > million yr	Polyhedron (26 faces) 45	0.8 long 0.9 dia	1968 Jun 15.2	0.16	1342.0	40303	33724	34126	0.005	115
IDCSP 4-7	1968-50G	1968 Jun 13.59 > million yr	Polyhedron (26 faces) 45	0.8 long 0.9 dia	1968 Jun 15.6	0.17	1345.2	40367	33721	34256	0.007	123
IDCSP 4-8	1968-50H	1968 Jun 13.59 > million yr	Polyhedron (26 faces) 45	0.8 long 0.9 dia	1968 Jun 15.6	0.13	1350.6	40476	33752	34143	0.009	109
Transtage 12 [Titan 3C]	1968-50J	1968 Jun 13.59 > million yr	Cylinder 1500?	6 long? 3 dia	1968 Jun 15.5	0.14	1356.7	40598	33729	34710	0.012	125*

*Approximate orbit.

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	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D R	Cosmos 227	1968-51A	1968 Jun 18.26 7.99 days 1968 Jun 26.25	Sphere-cylinder 5530?	5 long? 2.4 dia	1968 Jun 21.6	51.81	89.06	6608	190	269	0.006	22
D	Cosmos 227 rocket	1968-51B	1968 Jun 18.26 3.04 days 1968 Jun 21.30	Cylinder 2500?	7.5 long 2.6 dia	1968 Jun 18.6	51.80	89.00	6604	179	272	0.007	1
D	[Thorad Agena D]	1968-52A	1968 Jun 20.91 25 days 1968 Jul 16	Cylinder 2000?	8 long? 1.5 dia?	1968 Jun 21.1	84.99	89.75	6638	193	326	0.010	163
D	Capsule*	1968-52B	1968 Jun 20.91 569.24 days 1970 Jan 11.15	Octagon? 60?	0.3 long? 0.9 dia?	1968 Jun 21.2 1969 Feb 15.3 1969 Aug 16.3	85.18 85.1 85.1	94.15 93.53 92.56	6856 6826 6777	437 417 378	519 478 419	0.006 0.004 0.003	350 - -
D R	Cosmos 228	1968-53A	1968 Jun 21.50 11.92 days 1968 Jul 3.42	Sphere-cylinder 5900?	5.9 long 2.4 dia	1968 Jun 22.5	51.62	89.00	6604	199	252	0.004	30
D	Cosmos 228 rocket	1968-53B	1968 Jun 21.50 3.49 days 1968 Jun 24.99	Cylinder 2500?	7.5 long 2.6 dia	1968 Jun 23.1	51.67	88.60	6585	194	220	0.002	15
D	Fragments	1968-53C-F											
D	Cosmic Ray Package A**	1968-53G	1968 Jun 21.50 15.87 days 1968 Jul 7.37	Ellipsoid 200?	0.9 long 1.9 dia	1968 Jul 7.0	51.61	87.59	6531	153	153	0	0
D R	Cosmos 229	1968-54A	1968 Jun 24.46 7.79 days 1968 Jul 4.25	Sphere-cylinder 5530?	5 long? 2.4 dia	1968 Jun 27.0	72.87	89.85	6645	207	327	0.009	56
D	Cosmos 229 rocket	1968-54B	1968 Jun 26.46 8.01 days 1968 Jul 4.47	Cylinder 2500?	7.5 long 2.6 dia	1968 Jun 26.8	72.84	89.75	6640	202	322	0.009	53

* 1968-52B ejected from 1968-52A on June 20.98.

** 1968-53G ejected from Cosmos 228 about July 1.3.

	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
	Explorer 38* (RAE 1)**	1968-55A	1968 Jul 4.73 100000 years	Tubular cross 190	Arms of cross 229	1968 Jul 6.6 1968 Jul 7.4	120.64 120.64	156.71 224.41	9630 12234	642 5851	5862 5861	0.271 0.0004	162 148
	Explorer 38* rocket	1968-55B	1968 Jul 4.73 500 years	Cylinder 24	1.5 long 0.46 dia	1968 Jul 16.4	120.63	156.82	9635	636	5878	0.272	165
	Fragments	1968-55C,D											
D	Cosmos 230	1968-56A	1968 Jul 5.29 120.60 days 1968 Nov 2.89	Ellipsoid + 8 panels 400?	1.8 long 1.2 dia	1968 Jul 8.4 1968 Aug 31.2	48.40 48.37	92.75 92.12	6792 6760	285 277	543 487	0.019 0.016	131 -
D	Cosmos 230 rocket	1968-56B	1968 Jul 5.29 103.17 days 1968 Oct 16.46	Cylinder 1500?	8 long 1.65 dia	1968 Jul 5.4 1968 Aug 31.2	48.32 48.37	92.76 91.86	6793 6748	279 265	551 474	0.020 0.015	121 -
D	Molniya 1J	1968-57A	1968 Jul 5.64 1044 days 1971 May 15	Windmill 1000?	3.4 long 1.6 dia	1968 Jul 7.7 1969 Feb 15.3 1969 Nov 16.0	65.05 65.0 64.98	713.8 717.4 717.91	26480 26547 26560	401 573 435	39803 39764 39928	0.744 0.738 0.743	284 - -
D	Molniya 1J launcher rocket	1968-57B	1968 Jul 5.64 34.71 days 1968 Aug 9.35	Cylinder 2500?	7.5 long 2.6 dia	1968 Jul 6.0	65.03	91.35	6720	234	449	0.016	60
D	Molniya 1J launcher	1968-57C	1968 Jul 5.64 47 days 1968 Aug 22	Irregular	-	1968 Jul 6.7	65.01	91.65	6736	243	472	0.017	67
D	Fragments	1968-57D,E											
D	Molniya 1J rocket	1968-57F	1968 Jul 5.64 789 days 1970 Sep 2	Cylinder 440	2.0 long 2.0 dia	1968 Nov 18.5 1969 Oct 16.3 1970 Apr 1.0	64.95 64.97 64.97	711.0 710.9 710.28	26388 26387 26371	593 464 261	39427 39554 39724	0.736 0.741 0.748	282 - -
D R	Cosmos 231	1968-58A	1968 Jul 10.83 7.91 days 1968 Jul 18.74	Sphere-cylinder 5530?	5 long? 2.4 dia	1968 Jul 10.8	64.98	89.95	6650	199	345	0.011	45
D	Cosmos 231 rocket	1968-58B	1968 Jul 10.83 10.1 days 1968 Jul 20.9	Cylinder 2500?	7.5 long 2.6 dia	1968 Jul 12.8	64.96	89.52	6631	206	299	0.007	37

*1968-55A and 1968-55B remained attached until about Jul 7.25.

** Radio Astronomy Explorer.

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	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D	OV1-15 (Spades)*	1968-59A	1968 Jul 11.81 117.65 days 1968 Nov 6.46	Cylinder + hemispheres 215	1.47 long 0.66 dia	1968 Jul 12.8 1968 Aug 21.0 1968 Nov 1.0	89.88 89.86 89.78	104.82 101.10 91.88	7364 7188 6743	154 141 135	1818 1479 596	0.113 0.093 0.034	195 70 166
D	OV1-16 (Cannonball 1)	1968-59B	1968 Jul 11.81 38.67 days 1968 Aug 19.48	Sphere 273	0.58 dia	1968 Jul 11.9 1968 Aug 17.5	90.00 89.78	91.77 88.34	6737 6568	163 124	554 255	0.029 0.010	195 46
D	OV1-15 rocket	1968-59C	1968 Jul 11.81 35.62 days 1968 Aug 16.43	Cylinder 70?	2.05 long 0.72 dia	1968 Jul 14.1 1968 Aug 13.7	89.90 89.80	104.55 92.15	7350 6756	156 135	1788 621	0.111 0.036	194 85
D	OV1-16 rocket	1968-59D	1968 Jul 11.81 5 days 1968 Jul 16	Cylinder 70?	2.05 long 0.72 dia	1968 Jul 13.6	89.80	91.42	6721	141	544	0.030	194
D R	Cosmos 232	1968-60A	1968 Jul 16.55 7.73 days 1968 Jul 24.28	Sphere-cylinder 5530?	5 long? 2.4 dia	1968 Jul 16.6	65.32	89.85	6647	189	348	0.012	31
D	Cosmos 232 rocket	1968-60B	1968 Jul 16.55 10 days 1968 Jul 26	Cylinder 2500?	7.5 long 2.6 dia	1968 Jul 17.8	65.34	89.70	6639	201	321	0.009	24
D	Cosmos 233	1968-61A	1968 Jul 18.83 203.17 days 1969 Feb 7.00	Ellipsoid 400?	1.8 long 1.2 dia	1968 Jul 21.2 1968 Oct 31.2	81.94 81.94	102.05 98.22	7234 7051	198 191	1514 1154	0.091 0.068	68 -
D	Cosmos 233 rocket	1968-61B	1968 Jul 18.83 166.49 days 1969 Jan 1.32	Cylinder 1500?	8 long 1.65 dia	1968 Jul 24.8 1968 Oct 15.8	81.95 81.95	101.78 98.05	7222 7043	208 207	1479 1122	0.088 0.065	58 -

*Solar perturbation of atmospheric density experiments satellite

	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D R	Cosmos 234	1968-62A	1968 Jul 30.29 6.04 days 1968 Aug 5.33	Sphere-cylinder 5530?	5 long? 2.4 dia	1968 Jul 30.4	51.83	89.42	6626	208	288	0.006	52
D	Cosmos 234 rocket	1968-62B	1968 Jul 30.29 8.48 days 1968 Aug 7.77	Cylinder 2500?	7.5 long 2.6 dia	1968 Jul 31.2	51.78	89.41	6625	207	287	0.006	36
	BMEWS 1* [Atlas Agena D]	1968-63A	1968 Aug 6.47 > million yr	Cylinder 700 full? 350 empty?	1.7 long? 1.4 dia?	1968 Aug 7	9.9	1436	42150	31680	39860	0.097	-
D	[Titan 3B Agena D]	1968-64A	1968 Aug 6.69 9 days 1968 Aug 16	Cylinder 3000?	8 long? 1.5 dia	1968 Aug 10.0	110.00	89.85	6647	142	395	0.019	107
D	[Thorad Agena D]	1968-65A	1968 Aug 7.90 19.45 days 1968 Aug 27.35	Cylinder 2000?	8 long? 1.5 dia	1968 Aug 9.7	82.11	88.60	6583	152	257	0.008	178
	Explorer 39	1968-66A	1968 Aug 8.84 25 years?	Inflated sphere 9.3	3.66 dia	1968 Aug 11.6 1977 Mar 1.0	80.66 80.66	118.25 114.40	7982 7807	670 684	2538 2174	0.117 0.095	168 -
	Explorer 40 (Injun 5)	1968-66B	1968 Aug 8.84 500 years	Hexagonal cylinder 69.6	0.74 long 0.76 dia	1968 Aug 11.6	80.67	118.33	7985	681	2533	0.116	168
	Explorer 39 rocket	1968-66C	1968 Aug 8.84 300 years	Cylinder 24	1.5 long 0.46 dia	1968 Aug 12.6	80.67	118.40	7987	682	2535	0.116	167
	Fragments	1968-66D-J											

*Ballistic Missile Early Warning System. Agena D rocket (1968-63B) is probably in an orbit similar to 1970-46B.

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	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D R	Cosmos 235	1968-67A	1968 Aug 9.29 7.95 days 1968 Aug 17.24	Sphere-cylinder 5530?	5 long? 2.4 dia	1968 Aug 15.9	51.81	89.27	6619	201	281	0.006	65
D	Cosmos 235 rocket	1968-67B	1968 Aug 9.29 5 days 1968 Aug 14	Cylinder 2500?	7.5 long 2.6 dia	1968 Aug 11.0	51.79	89.00	6606	188	267	0.006	13
D	ATS 4 [Atlas Centaur]	1968-68A	1968 Aug 10.94 67.72 days 1968 Oct 17.66	Cylinder 2600	10 long 3 dia	1968 Aug 22.8	29.04	93.92	6851	219	726	0.037	258
	Essa 7 (Tiros 17)	1968-69A	1968 Aug 16.48 10000 years	Cylinder 145	0.57 long 1.07 dia	1968 Aug 16.5	101.72	114.98	7832	1432	1476	0.003	142
	Essa 7 second stage	1968-69B	1968 Aug 16.48 5000 years	Cylinder 350?	4.9 long 1.43 dia	1968 Sep 16.2	101.72	114.89	7828	1426	1473	0.003	166
	Fragments	1968-69C-G											
	Cosmos 236	1968-70A	1968 Aug 27.48 30 years	Cylinder + vanes 850?	2 long? 1 dia?	1968 Sep 4.7	56.07	96.83	6987	588	630	0.003	94
	Cosmos 236 rocket	1968-70B	1968 Aug 27.48 25 years	Cylinder 2200?	7.4 long 2.4 dia	1968 Aug 27.6	56.17	96.71	6981	575	631	0.004	92
D R	Cosmos 237	1968-71A	1968 Aug 27.52 7.79 days 1968 Sep 4.31	Sphere-cylinder 5530?	5 long? 2.4 dia	1968 Aug 31.4	65.42	89.70	6638	200	320	0.009	45
D	Cosmos 237 rocket	1968-71B	1968 Aug 27.52 7.95 days 1968 Sep 4.47	Cylinder 2500?	7.5 long 2.6 dia	1968 Aug 28.1	65.41	89.56	6632	194	313	0.009	40

	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D R	Cosmos 238	1968-72A	1968 Aug 28.42 3.95 days 1968 Sep 1.37	Cylinder + 2 wings 6520?	7.5 long 2.2 dia	1968 Aug 29.0	51.68	88.43	6579	188	214	0.002	306
D	Cosmos 238 rocket	1968-72B	1968 Aug 28.42 1.55 days 1968 Aug 29.97	Cylinder 2500?	7.5 long 2.6 dia	1968 Aug 28.6	51.81	88.31	6573	162	228	0.005	320
D R	Cosmos 239	1968-73A	1968 Sep 5.29 7.99 days 1968 Sep 13.28	Sphere-cylinder 5530?	5 long? 2.4 dia	1968 Sep 7.0	51.80	89.17	6614	203	269	0.005	38
D	Cosmos 239 rocket	1968-73B	1968 Sep 5.29 3.97 days 1968 Sep 9.26	Cylinder 2500?	7.5 long 2.6 dia	1968 Sep 7.8	51.79	88.60	6586	175	241	0.005	43
D	[Titan 3B Agena D]	1968-74A	1968 Sep 10.77 15 days 1968 Sep 25	Cylinder 3000?	8 long? 1.5 dia?	1968 Sep 11.9	106.06	89.82	6643	125	404	0.021	126
D R	Cosmos 240	1968-75A	1968 Sep 14.28 7.01 days 1968 Sep 21.29	Sphere-cylinder 5530?	5 long? 2.4 dia	1968 Sep 14.6	51.83	89.29	6620	202	232	0.006	23
D	Cosmos 240 rocket	1968-75B	1968 Sep 14.28 3.39 days 1968 Sep 17.67	Cylinder 2500?	7.5 long 2.6 dia	1968 Sep 15.4	51.81	88.95	6603	179	271	0.007	16
D	Zond 5 launcher rocket	1968-76C	1968 Sep 14.90 3 days 1968 Sep 18	Cylinder 4000?	12 long? 4 dia	1968 Sep 16.3	51.52	88.52	6584	193	219	0.002	339
D	Zond 5 launcher	1968-76B	1968 Sep 14.90 1.43 days 1968 Sep 16.33	Irregular	-	1968 Sep 15.0	51.61	88.89	6600	129	314	0.014	348
D	Fragment	1968-76D											

Space Vehicle: Zond 5, 1968-76A, after passing near the Moon returned to Earth and was recovered on 1968 Sep 21.67.

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	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D R	Cosmos 241	1968-77A	1968 Sep 16.52 7.79 days 1968 Sep 24.31	Sphere-cylinder 5530?	5 long? 2.4 dia	1968 Sep 17.1	65.42	89.73	6640	202	322	0.009	52
D	Cosmos 241 rocket	1968-77B	1968 Sep 16.52 6.45 days 1968 Sep 22.97	Cylinder 2500?	7.5 long 2.6 dia	1968 Sep 19.4	65.41	89.20	6614	190	282	0.007	35
D	[Thor Agena D]	1968-78A	1968 Sep 18.90 19.25 days 1968 Oct 8.15	Cylinder 1500?	8 long? 1.5 dia	1968 Sep 19.0	83.02	90.12	6658	167	393	0.017	162
D	Capsule*	1968-78B	1968 Sep 18.90 374.68 days 1969 Sep 28.58	Octagon? 60?	0.3 long? 0.9 dia?	1968 Sep 20.3 1969 Feb 15.3 1969 Jul 16.3	83.22 83.22 83.13	94.75 94.12 92.54	6085 6055 6776	500 471 334	514 482 401	0.001 0.0007 0.0005	201 - -
D	Cosmos 242	1968-79A	1968 Sep 20.61 53.69 days 1968 Nov 13.30	Ellipsoid 400?	1.8 long 1.2 dia	1968 Sep 22.6	70.97	91.29	6717	272	406	0.010	59
D	Cosmos 242 rocket	1968-79B	1968 Sep 20.61 32.06 days 1968 Oct 22.67	Cylinder 1500?	8 long 1.65 dia	1968 Sep 24.1	70.97	91.10	6707	275	382	0.008	54
D R	Cosmos 243	1968-80A	1968 Sep 23.32 10.88 days 1968 Oct 4.20	Sphere-cylinder 5900?	5.9 long 2.4 dia	1968 Sep 23.9	71.29	89.54	6631	213	293	0.006	57
D	Cosmos 243 rocket	1968-80B	1968 Sep 23.32 6.0 days 1968 Sep 29.3	Cylinder 2500?	7.5 long 2.6 dia	1968 Sep 24.2	71.33	89.31	6619	201	281	0.006	35
D	Passive Microwave Package A**	1968-80C	1968 Sep 23.32 19 days 1968 Oct 12	Ellipsoid 200?	0.9 long 1.9 dia	1968 Oct 2.8 1968 Oct 12.0	71.33 71.29	89.38 87.86	6622 6546	203 154	284 182	0.006 0.002	31 346

*1968-78B ejected from 1968-78A on Sep 18.97.
**1968-80C ejected from 1968-80A about Oct 2.2.

	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
	OV2-5	1968-81A	1968 Sep 26.32 > million yr	Box + 4 paddles 204	0.59 long 0.59 wide 0.61 high	1968 Sep 27.0	2.9	1417.9	41844	35116	35816	0.008	-
D	ERS-28 (OV5-2)	1968-81B	1968 Sep 26.32 29 months? 1971 Feb?	Octahedron 10	0.28 side	1968 Sep 26.4 1969 Feb 22.5 1970 Apr 1.0	26.37 25.85 26.0	630.3 587.2 345.5	24364 23229 16311	184 162 158	35787 33539 19707	0.731 0.718 0.599	359 - -
	ERS-21 (OV5-4)	1968-81C	1968 Sep 26.32 > million yr	Octahedron 13	0.28 side	1968 Sep 30.5	3.0	1435.8	42159	35776	35785	0.0001	-
	LES 6	1968-81D	1968 Sep 26.32 > million yr	Cylinder 163	1.83 long 1.22 dia	1968 Sep 27.0	3.0	1431.2	42069	35597	35785	0.002	-
	Transtage 13 [Titan 3C]	1968-81E	1968 Sep 26.32 > million yr	Cylinder 1500?	6 long? 3 dia	1968 Sep 26.6	3.04	1425.3	41954	35408	35744	0.004	322
D	Fragment	1968-81F											
D R?	Cosmos 244	1968-82A	1968 Oct 2.57 0.06 day 1968 Oct 2.63	Cylinder?	2 long? 1 dia?	1968 Oct 2.6	49.57	87.33	6524	134	158	0.002	142
D	Cosmos 244 rocket	1968-82B	1968 Oct 2.57 0.3 day? 1968 Oct 2	Cylinder 1500?	8 long? 2.5 dia?	1968 Oct 2.7	49.57	87.34	6524	133	159	0.002	142
D	Cosmos 244 launch platform	1968-82C	1968 Oct 2.57 0.5 day? 1968 Oct 3	Irregular	-	1968 Oct 2.7	49.58	87.84	6549	149	193	0.003	70

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	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D	Cosmos 245	1968-83A	1968 Oct 3.54 104.45 days 1969 Jan 15.99	Ellipsoid 400?	1.8 long 1.2 dia	1968 Oct 3.7 1968 Nov 30.5	70.98 70.9	92.12 91.09	6757 6706	284 253	473 403	0.014 0.011	75 -
D	Cosmos 245 rocket	1968-83B	1968 Oct 3.54 43.71 days 1968 Nov 16.25	Cylinder 1500?	8 long 1.65 dia	1968 Oct 4.8	70.99	91.80	6742	283	445	0.012	78
D	Aurorae (ESRO 1)	1968-84A	1968 Oct 3.87 630.41 days 1970 Jun 26.28	Cylinder-cone 81	1.52 long 0.76 dia	1968 Oct 4.5 1969 Jun 16.0 1970 Feb 15.3	93.76 93.76 93.7	103.00 99.64 95.54	7276 7120 6923	258 252 243	1538 1231 846	0.088 0.069 0.044	164 - -
D	Aurorae rocket	1968-84B	1968 Oct 3.87 313.48 days 1969 Aug 13.35	Cylinder 24	1.50 long 0.46 dia	1968 Oct 5.1 1969 Feb 15.3 1969 Jun 16.0	93.74 93.74 93.6	103.04 99.46 94.60	7278 7111 6873	260 250 238	1540 1215 761	0.088 0.068 0.038	162 - -
D	Fragments	1968-84C,D											
D	Molniya 1K	1968-85A	1968 Oct 5.02 2841 days 1976 Jul 16	Windmill 1000?	3.4 long 1.6 dia	1968 Oct 7.1 1968 Nov 17.3 1972 Feb 1.0	64.87 65.03 65.25	712.0 718.2 728.0	26413 26566 26810	436 466 1615	39633 39909 39248	0.742 0.742 0.702	235 284 -
D	Molniya 1K launcher rocket	1968-85B	1968 Oct 5.02 25.55 days 1968 Oct 30.57	Cylinder 2500?	7.5 long 2.6 dia	1968 Oct 9.4	64.96	91.07	6706	234	422	0.014	68
D	Molniya 1K launcher	1968-85C	1968 Oct 5.02 30.72 days 1968 Nov 4.74	Irregular	-	1968 Oct 11.8	64.96	91.43	6723	224	466	0.018	66
D	Molniya 1K rocket	1968-85D	1968 Oct 5.02 2405.32 days 1975 May 7.34	Cylinder 440	2.0 long 2.0 dia	1968 Nov 16.3 1969 Aug 16.3 1972 Jan 16.5	64.99 65.4 65.15	707.7 707.4 706.99	26306 26299 26289	466 366 1011	39390 39476 36811	0.740 0.743 0.719	284 - -

	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D	[Thorad Agena D]	1968-86A	1968 Oct 5.47 902.33 days 1971 Mar 26.80	Cylinder 2000?	8 long? 1.5 dia	1968 Oct 8.6 1969 Oct 31.7 1970 Jul 1.3	74.97 74.97 74.97	94.55 93.99 93.14	6875 6848 6806	483 462 421	511 478 435	0.002 0.001 0.001	248 - -
D R	Cosmos 246	1968-87A	1968 Oct 7.51 4.76 days 1968 Oct 12.27	Sphere-cylinder 5530?	5 long? 2.4 dia	1968 Oct 9.1	65.37	89.18	6613	149	321	0.013	11
D	Cosmos 246 rocket	1968-87B	1968 Oct 7.51 1.14 days 1968 Oct 8.65	Cylinder 2500?	7.5 long 2.6 dia	1968 Oct 8.4	65.38	88.31	6570	133	251	0.009	12
D R	Cosmos 247	1968-88A	1968 Oct 11.50 7.74 days 1968 Oct 19.24	Sphere-cylinder 5530?	5 long? 2.4 dia	1968 Oct 12.4	65.39	89.94	6650	199	345	0.011	56
D	Cosmos 247 rocket	1968-88B	1968 Oct 11.50 7 days 1968 Oct 18	Cylinder 2500?	7.5 long 2.6 dia	1968 Oct 13.7	65.42	89.50	6629	191	311	0.009	36
D 3M R	Apollo 7*	1968-89A	1968 Oct 11.63 10.84 days 1968 Oct 22.47	Cone-cylinder 14690	10.36 long 3.91 dia	1968 Oct 12.9	31.63	89.78	6642	231	297	0.005	88
D	Saturn IV B* [Saturn 205]	1968-89B	1968 Oct 11.63 6.83 days 1968 Oct 18.46	Cylinder 13600	18.7 long 6.6 dia	1968 Oct 11.8	31.6	89.84	6645	227	307	0.006	-
	Cosmos 248	1968-90A	1968 Oct 19.18 11 years	Cylinder? 1400?	4 long? 2 dia?	1968 Oct 20.1 1972 Feb 1.0	62.25 62.25	94.80 94.17	6887 6856	475 452	543 503	0.005 0.004	296 -
D	Fragments	1968-90B-E											

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*1968-89A and B were joined together until Oct 11.75.

	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
	Cosmos 249*	1968-91A	1968 Oct 20.17 100 years	Cylinder?	4 long? 1.5 dia?	1968 Oct 21.9	62.35	112.13	7703	493	2157	0.108	76
D	Cosmos 249 rocket	1968-91B	1968 Oct 20.17 1 day 1968 Oct 21	Cylinder 1500?	8 long? 2.5 dia?	1968 Oct 20.6	62.27	88.38	6573	136	254	0.009	83
17d	Fragments	1968-91C-CX											
	[Thor Burner 2]	1968-92A	1968 Oct 23.19 100 years	12-sided Frustum 195	1.64 long 1.31 to 1.10 dia	1968 Oct 23.6	99.00	101.45	7204	797	855	0.004	34
	Burner 2 rocket	1968-92B	1968 Oct 23.19 80 years	Sphere-cone 66	1.32 long 0.94 dia	1968 Nov 12.3	98.99	101.45	7204	801	851	0.003	340
D R	Soyuz 2**	1968-93A	1968 Oct 25.38 2.95 days 1968 Oct 28.33	Sphere-cylinder + 2 wings 6520?	7.5 long 2.2 dia	1968 Oct 26.2	51.66	88.30	6568	170	210	0.003	310
D	Soyuz 2 rocket	1968-93B	1968 Oct 25.38 1.83 days 1968 Oct 27.21	Cylinder 2500?	7.5 long 2.6 dia	1968 Oct 25.8	51.72	88.48	6576	196	200	0.0003	164
D M R	Soyuz 3**	1968-94A	1968 Oct 26.36 3.94 days 1968 Oct 30.30	Sphere-cylinder + 2 wings 6575	7.5 long 2.2 dia	1968 Oct 27.3 1968 Oct 28.4 1968 Oct 29.4	51.66 51.66 51.66	88.30 88.70 88.87	6568 6588 6597	177 176 196	203 244 241	0.002 0.005 0.003	2 - -
D	Soyuz 3 rocket	1968-94B	1968 Oct 26.36 1.79 days 1968 Oct 28.15	Cylinder 2500?	7.5 long 2.6 dia	1968 Oct 27.6	51.66	87.99	6553	170	180	0.0007	312

* Cosmos 249 passed close to Cosmos 248 on 1968 Oct 20.32, then exploded.

** Soyuz 2 and 3 close approach occurred on 1968 Oct 26.4.

	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
	Cosmos 250	1968-95A	1968 Oct 30.92 9.3 years	Cylinder + paddles? 900?	2 long? 1 dia?	1968 Nov 10.2 1970 Nov 25.0 1975 Feb 5.4	74.02 73.99 73.99	95.30 94.55 93.05	6910 6873 6802	522 486 419	542 504 428	0.001 0.001 0.001	325 - -
	Cosmos 250 rocket	1968-95B	1968 Oct 30.92 12 years	Cylinder 2200?	7.4 long 2.4 dia	1968 Nov 9.4 1971 Apr 1.0 1977 Jul 1.0	74.01 74.00 74.00	95.20 94.47 93.00	6905 6869 6799	514 484 418	540 498 424	0.002 0.001 0	328 - -
D	Fragments	1968-95C-G											
D R	Cosmos 251	1968-96A	1968 Oct 31.38 11.86 days 1968 Nov 12.24	Sphere-cylinder 6300?	6.5 long? 2.4 dia	1968 Nov 3.1 1968 Nov 9.3 1968 Nov 9.7	64.87 64.95 64.92	88.99 89.62 89.68	6606 6637 6640	201 186 227	255 332 296	0.004 0.011 0.005	6 74 51
D	Cosmos 251 rocket	1968-96B	1968 Oct 31.38 2.56 days 1968 Nov 2.94	Cylinder 2500?	7.5 long 2.6 dia	1968 Nov 1.1	64.94	88.74	6593	197	233	0.003	5
D	Cosmos 251 engine*	1968-96E	1968 Oct 31.38 18.09 days 1968 Nov 18.47	Cone? 600?full	1.5 long? 2 dia?	Orbit similar to 1968-96A							
D	Fragments	1968-96C,D											
	Cosmos 252**	1968-97A	1968 Nov 1.02 200 years	Cylinder?	4 long? 2 dia?	1968 Nov 8.0	62.32	112.45	7718	531	2149	0.105	75
18d	Fragments	1968-97B-DX											
D	[Thor Agena D]	1968-98A	1968 Nov 3.90 19.99 days 1968 Nov 23.89	Cylinder 1500?	8 long? 1.5 dia	1968 Nov 7.7	82.15	88.90	6597	150	288	0.010	137
D	[Titan 3B Agena D]	1968-99A	1968 Nov 6.80 14 days 1968 Nov 20	Cylinder 3000?	8 long? 1.5 dia	1968 Nov 11.0 1968 Nov 19.8	106.0 105.97	89.73 89.03	6638 6604	130 134	390 318	0.020 0.014	127 107

* This engine, ejected from Cosmos 251 on 1968 Nov 12, retained the 1968-96A designation in the USA.

**Cosmos 252 passed close to Cosmos 248 on 1968 Nov 1.17, then exploded.

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	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
	TTS 2	1968-100B	1968 Nov 8.41 12 years	Octahedron 18	0.28 side	1968 Nov 14.3 1970 Nov 30.9	32.87 32.87	97.78 96.63	7037 6980	378 365	940 839	0.040 0.034	190 -
	Pioneer 9 second stage	1968-100D	1968 Nov 8.41 3443 days	Cylinder 400?	4.9 long 1.43 dia	1968 Nov 30.5 1970 Jul 1.0 1974 May 16.5	32.85 32.85 32.85	97.71 96.60 94.25	7034 6979 6864	374 365 345	937 836 626	0.040 0.034 0.020	- - -
D	Fragments	1968-100C,E											
D	Zond 6 launcher	1968-101B	1968 Nov 10.80 1.49 days 1968 Nov 12.29	-	-	1968 Nov 11.6	51.49	87.91	6553	175	175	0.000	137
D	Zond 6 launcher rocket	1968-101C	1968 Nov 10.80 3.16 days 1968 Nov 13.96	Cylinder 4000?	12 long? 4 dia	1968 Nov 11.3	51.49	88.63	6587	186	232	0.004	334
D	Fragments	1968-101D,E											
D R	Cosmos 253	1968-102A	1968 Nov 13.50 4.80 days 1968 Nov 18.30	Sphere-cylinder 5530?	5 long? 2.4 dia	1968 Nov 14.9	65.42	89.87	6645	200	333	0.010	53
D p	Cosmos 253 rocket	1968-102B	1968 Nov 13.50 7.25 days 1968 Nov 20.75	Cylinder 2500?	7.5 long 2.6 dia	1968 Nov 15.7	65.40	89.54	6630	195	309	0.009	45
D	Proton 4	1968-103A	1968 Nov 16.49 249.96 days 1969 Jul 24.45	Cylinder 17000	3 long 4 dia	1968 Nov 16.8 1969 Feb 15.3	51.55 51.55	91.75 91.18	6741 6714	248 243	477 428	0.017 0.014	84 -
D	Proton 4 rocket	1968-103B	1968 Nov 16.49 69.73 days 1969 Jan 25.22	Cylinder 4000?	12 long? 4 dia	1968 Nov 18.2 1968 Dec 15.5	51.54 51.54	91.67 91.10	6738 6710	252 238	468 425	0.016 0.014	87 -

Space Vehicles: Pioneer 9 is 1968-100A; Zond 6 is 1968-101A; passed Moon, recovered on Earth 1968 Nov 17.59.

	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D R	Cosmos 254	1968-104A	1968 Nov 21.51 7.72 days 1968 Nov 29.23	Sphere-cylinder 5530?	5 long? 2.4 dia	1968 Nov 22.3	65.40	89.85	6644	197	335	0.010	50
D	Cosmos 254 rocket	1968-104B	1968 Nov 21.51 6.16 days 1968 Nov 27.67	Cylinder 2500?	7.5 long 2.6 dia	1968 Nov 23.1	65.40	89.55	6631	187	318	0.010	39
D R	Cosmos 255	1968-105A	1968 Nov 29.53 7.77 days 1968 Dec 7.30	Sphere-cylinder 5530?	5 long? 2.4 dia	1968 Nov 30.2	65.42	89.64	6635	197	317	0.009	44
D	Cosmos 255 rocket	1968-105B	1968 Nov 29.53 5.53 days 1968 Dec 5.06	Cylinder 2500?	7.5 long 2.6 dia	1968 Nov 30.7	65.40	89.42	6625	188	306	0.009	35
	Cosmos 256	1968-106A	1968 Nov 30.50 3000 years	Spheroid + 2 vanes? 650?	1.6 dia?	1968 Dec 1.2	74.05	109.45	7579	1175	1227	0.003	168
	Cosmos 256 rocket	1968-106B	1968 Nov 30.50 2000 years	Cylinder 2200?	7.4 long 2.4 dia	1968 Dec 2.8	74.04	109.33	7573	1168	1222	0.004	155
D	Cosmos 257	1968-107A	1968 Dec 3.62 91.54 days 1969 Mar 5.16	Ellipsoid 400?	1.8 long 1.2 dia	1968 Dec 4.6	70.94	91.97	6752	286	462	0.013	83
D	Cosmos 257 rocket	1968-107B	1968 Dec 3.62 43.44 days 1969 Jan 16.06	Cylinder 1500?	8 long 1.65 dia	1968 Dec 4.4	70.95	91.47	6727	275	423	0.011	84

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	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D	[Titan 3B Agena D]	1968-103A	1968 Dec 4.81 8 days 1968 Dec 12	Cylinder 3000?	8 long? 1.5 dia	1968 Dec 5.8 1968 Dec 11.1	106.24 106.17	93.30 91.94	6814 6747	136 134	736 604	0.044 0.035	56 127
D	Heos 1*	1968-109A	1968 Dec 5.79 2518 days 1975 Oct 28	16-sided cylinder 108	0.75 long 1.26 dia	1968 Dec 5.8 1970 Nov 7.6 1971 Dec 31.9	28.28 60.50 68.20	6750 6704.2 6704.1	118,300 117,778 117,782	418 20020 32430	223,440 202,780 190,380	0.943 0.776 0.671	268 - -
D	Heos 1 second stage	1968-109B	1968 Dec 5.79 21.84 days 1968 Dec 27.63	Cylinder 350?	4.9 long 1.43 dia	1968 Dec 8.8	28.3	93.66	6839	177	745	0.042	223
	OAO 2	1968-110A	1968 Dec 7.36 500 years	Octagonal cylinder 2012	3.05 long 2.15 dia	1968 Dec 10.4	35.00	100.16	7150	765	778	0.0009	315
	OAO 2 rocket	1968-110B	1968 Dec 7.36 200 years	Cylinder 1815	8.6 long 3.0 dia	1968 Dec 7.7	35.00	100.06	7145	717	817	0.007	239
D R	Cosmos 258	1968-111A	1968 Dec 10.35 7.90 days 1968 Dec 18.25	Sphere-cylinder 5530?	5 long? 2.4 dia	1968 Dec 11.0	64.98	89.59	6630	205	298	0.007	48
D	Cosmos 258 rocket	1968-111B	1968 Dec 10.35 6.82 days 1968 Dec 17.17	Cylinder 2500?	7.5 long 2.6 dia	1968 Dec 12.1	64.97	89.35	6620	202	282	0.006	32
D	[Thorad Agena D]	1968-112A	1968 Dec 12.93 15.65 days 1968 Dec 28.58	Cylinder 2000?	8 long? 1.5 dia	1968 Dec 13.6	81.02	88.67	6587	169	248	0.006	185
	Capsule	1968-112B	1968 Dec 12.93 10000 years	Octagon? 60?	0.3 long? 0.9 dia?	1968 Dec 14.7	80.33	114.45	7808	1391	1468	0.006	282
	Fragments	1968-112C-E											

* Highly eccentric orbit satellite (ESRO): Third stage Altair, 1968-109C (identical to 1968-55B) in orbit similar to 109A.

AD-A058 842 ROYAL AIRCRAFT ESTABLISHMENT FARNBOROUGH (ENGLAND) F/G 22/2
REVISED TABLE OF EARTH SATELLITES. VOLUME 1. 1957 TO 1968.(U)
JAN 78 D G KING-HELE, H HILLER

UNCLASSIFIED RAE-TR-78012 DRIC-BR-63010 NL

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	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
D	Cosmos 259	1968-113A	1968 Dec 14.22 142.21 days 1969 May 5.43	Ellipsoid 400?	1.8 long 1.2 dia	1968 Dec 15.8 1969 Feb 22.5	48.40 48.38	100.22 97.45	7151 7013	215 208	1331 1072	0.078 0.062	107 -
D	Cosmos 259 rocket	1968-113B	1968 Dec 14.22 147.31 days 1969 May 10.53	Cylinder 1500?	8 long 1.65 dia	1968 Dec 15.1 1969 Feb 22.5	48.40 48.40	100.00 97.37	7140 7014	216 210	1308 1062	0.077 0.061	104 -
D	Fragment	1968-113C											
	Essa 8	1968-114A	1968 Dec 15.72 10000 years	Cylinder 132	0.56 long 1.07 dia	1968 Dec 16.4	101.90	114.70	7820	1410	1473	0.004	294
	Essa 8 second stage	1968-114B	1968 Dec 15.72 5000 years	Cylinder 350?	4.9 long 1.43 dia	1968 Dec 16.4	101.90	114.60	7815	1410	1460	0.003	283
	Fragments	1968-114C,D											
D	Cosmos 260*	1968-115A	1968 Dec 16.39 1666 days 1973 Jul 9	Windmill 1000?	3.4 long 1.6 dia	1968 Dec 16.9 1969 Nov 8.5 1971 Oct 16.5	64.93 65.0 65.0	712.36 712.26 712.20	26422 26420 26419	518 962 966	39570 39122 39115	0.739 0.722 0.722	285 - -
D	Cosmos 260 launcher	1968-115B	1968 Dec 16.39 52.21 days 1969 Feb 6.60	Irregular	-	1968 Dec 17.2	64.91	92.01	6753	240	510	0.020	71
D	Cosmos 260 launcher rocket	1968-115C	1968 Dec 16.39 32.71 days 1969 Jan 18.10	Cylinder 2500?	7.5 long 2.6 dia	1968 Dec 17.5	65.00	91.57	6730	230	473	0.018	69
D	Cosmos 260 rocket	1968-115D	1968 Dec 16.39 1740 days 1973 Sep 21	Cylinder 440	2.0 long 2.0 dia	1968 Dec 22.3 1969 Nov 8.5 1971 Oct 16.5	64.84 65.0 64.94	708.62 708.54 708.54	26330 26328 26328	494 966 963	39410 38934 38937	0.739 0.721 0.721	285 - -

*This is probably a Molniya satellite, replacing Molniya 1H (1968-35A).

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	Name		Launch date, lifetime and descent date	Shape and weight (kg)	Size (m)	Date of orbital determination	Orbital inclination (deg)	Nodal period (min)	Semi major axis (km)	Perigee height (km)	Apogee height (km)	Orbital eccentricity	Argument of perigee (deg)
	Intelsat 3B (F-2)	1968-116A	1968 Dec 19.02 >million yr	Cylinder 293 full 137 empty	1.04 long 1.42 dia	1968 Dec 20.5 1977 May 13.0	0.7 6.47	1436 1632.52	42160 45927	35770 39365	35790 39732	0.0002 0.004	- 56†
D	Intelsat 3B third-stage	1968-116B	1968 Dec 19.02 1650 days 1973 Jun 26	Cylinder 24	1.5 long 0.46 dia	1972 May 1.0 1973 Jan 1.0	29.6 29.8	588.5 571.9	23263 22823	368 236	33401 32653	0.710 0.710	- -
D	Cosmos 261	1968-117A	1968 Dec 20.00 54.33 days 1969 Feb 12.33	Ellipsoid 400?	1.8 long 1.2 dia	1968 Dec 20.6 1969 Jan 12.7	71.03 71.03	93.08 92.01	6803 6751	207 195	642 551	0.032 0.026	85 41
D	Cosmos 261 rocket	1968-117B	1968 Dec 20.00 18.48 days 1969 Jan 7.48	Cylinder* 1500?	8 long* 1.65 dia	1968 Dec 22.8	71.00	92.85	6792	203	624	0.031	83
D	Fragments	1968-117C-Z											
D 3M R	Apollo 8	1968-118A	1968 Dec 21.54 6.12 days 1968 Dec 27.66	Cone-cylinder 28400 full 15640 empty	10.36 long 3.91 dia	1968 Dec 21.6 1968 Dec 21.66	32.60 30.71	88.15 24,400	6569 273,000	191 174	191 533,000	0 0.976	265 30
						In selenocentric orbit 1968 Dec 24.42 - Dec 25.25							
	Saturn IV B** [Saturn 503]	1968-113B	1968 Dec 21.54 Indefinite	Cylinder 11800	24.5 long 6.6 dia	1968 Dec 21.6	32.60	88.15	6569	191	191	0	265
						Entered heliocentric orbit 1968 Dec 21.67							
D	Cosmos 262	1968-119A	1968 Dec 26.41 204.20 days 1969 Jul 18.61	Ellipsoid 400?	1.8 long 1.2 dia	1968 Dec 27.78 1969 Feb 22.5	48.44 48.44	95.13 94.22	6907 6864	259 252	798 720	0.039 0.034	113 -
D	Cosmos 262 rocket	1968-119B	1968 Dec 26.41 124.87 days 1969 Apr 30.28	Cylinder 1500?	8 long 1.65 dia	1968 Dec 29.95 1969 Feb 22.5	48.45 48.45	94.30 93.60	6897 6834	257 252	781 660	0.038 0.030	124 -

* Before disintegration.

**Attached to 118A until Dec 21.67.

† Orbit raised when transmissions terminated.

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* Only Thor Agena D satellites with periods about 94.7 min are indexed.

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REPORT DOCUMENTATION PAGE

Overall security classification of this page

UNLIMITED

As far as possible this page should contain only unclassified information. If it is necessary to enter classified information, the box above must be marked to indicate the classification, e.g. Restricted, Confidential or Secret.

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17. Abstract

An earlier version of this Table was issued in 1970. The present revised edition incorporates several thousand amendments that have accumulated in the past eight years, and supersedes the previous version. Satellites launched in the years 1969-1973 are listed in Volume 2 (issued in 1974) and the launches during 1974-1978 will appear in Volume 3.

The present volume includes 768 satellite launches, arranged chronologically. For each launch, the Table gives the name and international designation of each instrumented satellite and final-stage rocket, with the date of launch, lifetime (actual or estimated), mass, shape, dimensions and at least one set of orbital parameters. Other fragments associated with a launch are listed without these details.

The main Table, which occupies 184 pages, is prefaced by nine pages of introduction and explanation, and followed by a nine-page index.

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